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A
TREATISE
OF THE
DISEASES
OF THE
BONES;

Containing an Exact and Compleat

ACCOUNT
OF THE
NATURE, SIGNS, CAUSES and CURES
thereof, in all their various KINDS.

WITH

Many new and curious OBSERVATIONS concerning the VENEREAL and other DISTEMPERS; with the newest and best Method of Practice, in each respective CASE.

AS ALSO

The FIGURES representing the several Dressings, Machines and Instruments here described.

Translated from the *French* of JOHN-LEWIS PETIT, of the Royal Academy of Sciences, sworn Surgeon of *Paris*, and late Master of his Company.

L O N D O N :

Printed for T. WOODWARD, at the *Half-Moon*, over-against *St. Dunstan's Church*, in *Fleet-Street*, M,DCC,XX,VI.





T H E
P R E F A C E.



T H E first time that
my *Treatise of the Dis-
eases of the Bones* saw
the Light, Self-Love
induced me to think
that I made the World a very
valuable Present. 'Tis true, I
had already some Experience in
A 2 Surgery ;

Surgery ; and the Authors I had read, had not written any Thing better.

THE Foreigners, and the Students of our Nation, who were present at my private Lectures, were so well satisfied with them, that they desired I would give them my Dictates ; but as I had not transcrib'd any Thing upon that Head, I propos'd their writing down, themselves, what they remembered of my Lessons, promising to make what Corrections and Additions were necessary therein. They did so ; I kept my Word ; and from the Lectures I then read, a rough Draught was formed, whereon I have worked with tolerable Success.

MY Manuscript was soon spread all over *Paris*, and the Fear of seeing it published, with all its Errors,

The P R E F A C E.

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rors, obliged me to give it to the
Sieur *d' Houry*, a Bookseller, to
print.

CONTRARY to my Expecta-
tion, my Book was translated into
several Languages. The first Re-
ception proving so favourable, I
was tempted to set about a se-
cond Edition, which had been
more immediately finished, had I
not been hindered by certain Parts
of my Profession, which prevented
my applying my self entirely to
the Practice of Chirurgical Ob-
servations, and the Cure of Vene-
real Distempers, to which the Pub-
lick were desirous I should confine
my self.

WHEN I have any leisure
Hours, I will imploy them in wri-
ting those Observations I have al-
ready made, and which I am still
daily making, in the Practice of Sur-

gery ; and I will publish them from Time to Time, after this Treatise. This Promise shall be effectually performed , and that with the greater Advantage to Students, by Reason most Part of those who have treated of Surgery, are Persons who have never practised it, or Surgeons to whom the Publick allow'd sufficient Time to write ; but not Business enough to enable them to relate Matters of Fact verified by their own Experience. 'Tis the Misfortune of past Ages : They who did not practice Surgery, have treated of it ; and they who have practiced it most successfully, have let their Observations die with them.

WHEREFORE 'tis necessary for such as have practised, and continue therein, not to be sparing of their Knowledge ; but that they either communicate it during their
Lives,

The P R E F A C E. vii

Lives, or at least leave it to Persons who may publish it after their Decease.

N O T to do so, is to commit a Crime against Humanity ; 'tis violating the Laws of Society ; and (to use that Expression) dying insolvent. I hope I shall not deserve that Reproach : These Laws are to me so sacred, and I carry the Scruple so far, that I reserve nothing particular for my own Children, although I design them for Surgery : They shall be equal Sharers with all the Students ; and shall have no Advantage over them, but that of being under my Eye, and trained up by me. Above all, I will inspire them with the Love I bear my Country ; and if, at my Death, I am any Thing indebted to her, I hope they will be able to discharge for me what

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I have not had Time to repay her.

IN order to satisfy the Obligation I contracted, I begin with the *Treatise of the Diseases of the Bones*: This Work cost me more Pains than I imagined. To save Time, I was willing the first Edition should be my Guide in finishing the second; but I found, too late, that I should have had less Trouble if I had wrought upon a new Plan. The Work will not be less valuable; I dare even believe, that it will be more useful to young Surgeons, because I have followed the Order of the School; it may indeed tire the Masters of the Art; but the one will be obliged to me, and the others will excuse it.

I HOPE it will be forgiven me if the Stile is not equal throughout the Work. It might have been so
if

if I had perceived sooner that it is more difficult to comment upon a Book, than to write a new one. In some places they will find the same plain Stile which was proper for me to use twenty Years ago, when I wrote the first Edition : In others they will see that I have risen above my self, by some Pieces that I had Leisure to finish ; but what will make an amends for this Inequality, is the Exactness, and Truth in the Relation of Matters of Fact, and the ingenious Confession that is made of the Events, whether successful or otherwise.

AMONGST those that are cited, the *Rupture of the Tendon of Achilles* is the only one that has, as yet, been disputed me ; but, I hope, that in reading what is here said upon that Head, the Truth will be known by the Proofs I have given,

given, and yet better by the Objections that have been made to it. 'Twere to have been wished, that before my printing the Chapter of the Rupture of the Tendons, I had read what *Paræus* says concerning that of the Tendon of *Achilles* ; I should have quoted him, and perhaps, my Adversaries would have been satisfied with that Authority ; it is at least, as much to be regarded as that of *Taliocottius*, an Author descending in a right Line from the old Restorers of the Nose.

LET not what I have said of *Paræus* be looked upon as an useless Episode ; I was obliged to justify my self, or rather to prevent those who might have reproached me with not having quoted so famous an Author. The Truth is, that not having read that Part of his Book till mine was

was entirely printed off, I could not do him Justice but in this Preface.

THE first Part of this Work treats of the Diseases that affect the Joints : The Luxations in general, and each in particular, are amply explained therein ; on their Account I speak of the *Cliquetis* and Sprains ; the last Chapter is a compleat Treatise of the *Anchylosis* ; each Article contains a great Number of Remarks and Observations, which will be of Advantage to young Students, for whose Benefit I write.

THEY will also be instructed in several Places, how to prevent being imposed on by certain Bone-setters : I have taken Care to discover the Artifices they use among the People, through whose Igno-

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Ignorance and Simplicity they have acquired the false Reputation they enjoy.

THE second Part contains all the Diseases that affect the Body of the Bone. Both the Fractures in general, and the simple and complicated ones, of each Bone in particular, are amply treated of therein : And the Prognostick, manual Operation, and Cure of all are authorised by several Observations. In each Part there will be found divers Distempers that have not been taken Notice of by any Author, ancient or modern. Both in the one and the other I have placed Figures, with alphabetical Letters, to describe the Dressings and Machines that are proper for the Cure of fractured or dislocated Bones. The Practice of the ignorant Bone-setters

ters is there set down for the Instruction of young Pupils, and to disabuse the People.

THE last Chapter but one is a very ample Treatise of the *Exostosis* and *Caries* : I may venture to say, that this Disease was never so exactly examined into : There are numberless Observations inserted, to give a clear Insight into the Matter ; and the Aphorisms, that conclude it, make me flatter my self, that it will be acceptable to all, who not being implicit Admirers of Antiquity, are willing to give their Votes in Favour of such new Discoveries as are founded upon Reason and Experience.

THE last Chapter is a Treatise of the *Rickets*, wherein not only the Causes of the Distemper and its Symptoms are searched into,

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to, but the Reason of the Softness and Crookedness of the Bones are explained ; the Sentiments of the Authors most in vogue quoted, the Objections answered, and the whole concludes with the Cure of this Distemper.

IF I have taken Pains to make my Work useful, the Bookseller, on his Side, has done his utmost to render the Edition perfect : The Approbation of the Publick will satisfy the one, and a quick Sale will be a Recompence for the other.

EXTRACT

EXTRACT of the REGISTERS of the Royal Academy of Sciences, for the Years 1720, 1721, 1722.

MESSIEURS *Litie* and *Winslow*, who were appointed to examine Mr. *Petit* the Surgeon's *Treatise of the Diseases of the Bones*, having made their Report to the Company ; and having said, that this Work was answerable to those signal Proofs of Skill in Anatomy, Industry in Mechanicks, Dexterity in Surgery, Fertility in Invention, Solidity in Practice, and Clear-

xvi E X T R A C T, &c.

Clearness in Demonstration, which the Author has, for these many Years, continued to give the Publick, they have judged it worthy of being printed. As a Testimony whereof I have signed this present Certificate.

Paris the 1st of March 1723.

Fontenelle.

Perpet. Secret. to the Royal
Academy of Sciences.





A

TREATISE

OF THE

Diseases of the Bones.

THE Diseases of the Bones are of two Sorts; the one affects the Bones themselves, and the other their Joints only. The Body of the Bone is subject to be hurt by a *Fracture*, *Exostosis*, *Caries*, *Softness*, and *Crookedness*. The Joints are

afflicted with the *Gout*, the *Anchilosis*, *Rattling*, *Sprains*, and *Luxations*. I shall begin with the two last of these Distempers.

B

BOOK



BOOK I.

Of LUXATIONS and SPRAINS.

CHAP. I.

Of LUXATIONS in General.

Defini-
tion.

Luxation is a Dislocation of one, or more Bones, from the Place where they are naturally jointed.

6 Things
requisite
to be
known.

Several Things are absolutely necessary for the Cure of *Luxations*. 1. One must have a perfect Idea of the Structure of the Parts aggrieved. 2. One must know the different Sorts of *Luxations*. 3. What are the Causes. 4. The Signs by which it may be judged that the Bones are dislocated. 5. The Accidents which arise from thence. 6. What may be prefaged thence. And lastly, the different Means that are to be used in the Cure.

Structure of the Parts.

An Idea of the Structure of the Parts may be formed from the Species of the *Articulation*, the *Ligaments*, the *Muscles*, the *Cartilages*, the *Synovia*, the *Vessels*, the *Fat*, and even the *Skin*.

Of

Of the Species of Articulation.

This represents to the Chirurgeon the natural Form and Figure of *Articulation*, which may be by a *Genou*, or Ball and Socket, or by a *Ginglymus*; by a *Genou*, with a large Head, and deep Cavity, as that of the Thigh in the *Iscium*; or by a *Genou* with large Head and shallow Cavity, like the Bone of the Arm with the *Omo-plata*; or by a *Genou* with a little Head and small Cavity, like the Joints of the first *Phalanges* of the Fingers, with the *Ossa Metacarpi*, *Metatarfi*, and others.

The Species of Articulation.
Genu, or Ball and Socket.

The Joints by *Ginglymus* have sometimes two Heads, and two Cavities, as the Leg with the Thigh; or three Heads, and three Cavities as the *Cubitus*, the *Humerus*, and others.

Ginglymus.

Of the Nature of Ligaments.

The Ligaments of the Joints are of three Sorts; the first serve only as Tunicles to retain the *Sinovia*, and to hinder its diffusing it self any where but about the Joints. The second are as Bands to strengthen the Bones, or to limit their Motions, like the circular Ligaments of the Joints by a *Genou*, the right, oblique, or transverse Ligaments of the Joints by *Ginglymus*, whereof I shall make Mention in treating of each in particular.

Ligaments.
Three Sorts.

The last Sort of Ligaments comprehends those which direct the Motions of the Body, as the Semi-circular Ligaments of the upper and lower Part of the *Radius*, the hinder one of the *Processus Dentiformis*, and several others.

Of the Disposition of the Muscles.

Disposition of the Muscles.

For the Cure of Luxations, the Knowledge of the Disposition of the Muscles which move the Joints, together with their Number, Force, and Situation, and whether they have Tendons, or *Aponcuroseis*, is very necessary. Without this Knowledge, 'tis impossible to have a just Idea of the Dislocation of Bones, or what Measures must be taken to reduce them. One must also know which Muscles are peculiar to the Motion of the Joint, and which only pass by it, in order to insert themselves elsewhere; all which 'tis very requisite to observe, as will be seen by the Sequel.

Of Cartilages.

Cartilages:

3 Kinds.

Some Cartilages cover and render smooth and polished, the Heads and Cavities of the Bones, others raise the Sides; and there is a third Sort, which, without belonging to any of the articular Bones, is placed between both: These are called *Mediums*, this is observed in the Articulation of the under Jaw, in that of the Leg with the Thigh, and of the *Cubitus* with the *Carpus*.

Of the Sinovia.

Sinovia.

The Sinovial Glands.

Asto the *Sinovia*, 'tis known that it flows from little Glands near the Ligaments. 'Tis a Liquor something viscos, but very clear and transparent, which falls upon the jointing of the Bones, to facilitate their Motion. What is superfluous is taken back again by absorbent Pipes or Glands, as the superfluous Moisture is re-

taken

taken by the *Puncta lachrymalia*, as the *Lympha* of the Ventricles of the Brain is conducted to the pituitary Gland by the *Infundibulum*; or lastly, as the *Lympha* of the *Pericardium*, with that of the Cavity of the Breast, of the *Venter infimus*, and others, are resum'd by absorbent Pipes or Glands, when there is a Quantity more than necessary to lubricate those Parts, and make them slip and move easily one against the other.

Absorbent Glands.

other absorbent Glands.

Of the Passage of the Vessels.

One must observe what Course the great Vessels take, to avoid pressing them, either in Extensions, or in putting on Bandages. Besides, this Knowledge enables us to give a Reason for *Phænomena*, to make our Prognostick of the Issue, and to determine us sooner or later to set about the Reduction.

Passage of the Vessels.

Of the Fat.

The Fat is necessary to be observ'd chiefly for the right Application of the Straps, in those who are in good Case. It even directs us to general Remedies, and makes us prescribe a *Regimen* more or less strict accordingly.

Fat.

Of the Skin.

As to the Skin, one must consider its Wrinkles, Scars, Wounds, Ulcers, Issues, and Defects of Conformation, as Warts, and other Excrescencies, to the End that one may avoid them, as shall be remarked in the Sequel.

Skin.

Observations.

Upon what has been said, the following Reflections may be made.

First Reflection. The Articulations by a Ginglymus, First Reflection.

mus, are not easily dislocated and their Luxations are almost always incompleat, both because they have several Heads, and several Cavities, whence a great Part of their Surfaces touch each other; and because their Ligaments are very short, very many, and have different Directions, which renders them very strong.

Second
Reflection-
on.

Second Reflection. The Bones that are join'd by *Ginglymus* have their Motion restrain'd to Bending and Extension.

Third
Reflection-
on.

Third Reflection. Those which are join'd by a *Genou* having but one Head, and one Cavity, hardly touch each other but at a Point.

Fourth
Reflection-
on.

Fourth Reflection. The Ligaments of the Joints by a *Genou*, are more loose, and not so strong, nor so numerous as the others, and have generally but one Direction, except at the Articulation of the Thigh Bone with the Hip.

Fifth Re-
flection.

Fifth Reflection. The *Genoux* are not at all limited in their Motions, since they perform Adduction, Abduction, and Rotation.

Sixth Re-
flection.

Sixth Reflection. The *Genoux* are always primary, that is to say, the first Articulation of the Limbs, as may be seen by the Articulation of the Arm, which is the first of the upper Extremity; by that of the Wrist, which is the first of the Parts of the Hand; and by that of the first *Phalanx* of the Fingers; the second and third are joined by a *Ginglymus*.

It is the same in the lower Extremity, except the first Articulation of the Foot, which is a *Ginglymus*, because the Foot ought to be capable of a greater Resistance than the Hand, to sustain the Weight of the Body.

The *Genoux* being thus Primary, are more liable to Luxations; because in Blows and Falls, the Strain is more felt there, than elsewhere.

Seventh Reflection. For this Reason, and all those aforementioned, it is demonstrable, that the Bones jointed by a *Genou*, are more easily dislocated than those that are join'd by a *Ginglymus*. Seventh Reflection.

Eighth Reflection. 'Tis also observed that they generally suffer a compleat *Luxation*, which is different from the *Ginglymus*, which can hardly ever be compleatly disjointed by an external Cause without some terrible Accidents happening, often the Loss of the Limb, and even Death it self; caused by the Rupture of the Ligaments, or the Tendons, and sometimes of the Vessels, and Membranes. Eighth Reflection.

If we consider the long Way that a Bone join'd by a *Ginglymus* must be forced, to be entirely dislocated, we cannot wonder at the Disorders caus'd by its compleat *Luxation*.

It may also be observed, that if an incompleat *Luxation* seldom happens to the Bones join'd by a *Genou*, 'tis because their Heads are exactly round, and the Sides of their Cavities very narrow; for which Reason the Head being upon the Side, is supported only by one Point, whence it slips, not being able to stay there, and sometimes re-enters its Cavity, sometimes falls farther off, amongst the Parts adjacent. Observation.

Nevertheless, Authors say, that the Bones of the Thigh and Arm may be disjointed more or less. This ought not always to be understood of an incompleat *Luxation*, but of a compleat one; when the Bone, being entirely forced out of its Cavity, may be removed to a greater or lesser Distance from it, either by a Contraction of the Muscles, the Fall of the sick Person, his Motion after the Fall, or the unprofitable Experiments of those who are neither Remark upon Authors.

versed in the Theory, nor Practice of these Diseases.

Ninth
Reflection.

Ninth Reflection. The Disposition and Force of the Muscles help us to give a Reason for the different Figure of the Limbs when dislocated, and to find the Place where the Head of the Bone lies. It also teaches us the easiest Means to set it, and how to dispose, place, and proportion the Strength employed for Extensions, Counter-Extensions, and Conformations.

Tenth
Reflection.

Tenth Reflection. It is useful to have a just Idea of the Shape and Figure of Cartilages; especially of those which are *Mediums*, and those which form the Sides of the Cavities; because the one may give Way whilst the Bone is reducing, and one must avoid over-setting the other in the Cavity, whilst the Head of the dislocated Bone is entering into it.

Eleventh
Reflection.

Eleventh Reflection. 'Tis not less necessary to be skill'd in the Nature of the *Sinovia*, which runs into the Articulation. 'Tis known that this Liquor serves to facilitate the Motion of the Joints, as Grease does that of Wheels; and that when it abounds too much, and is corrupted and thick, it hinders their Motion. Sometimes it unites the Bones, and soders them (if I may so speak) which causes *Anchiloses*; or else it drives and forces them out of their Cavities, which occasions troublesome Luxations. Often it corrodes and rots the Cartilages, and even the Bones themselves, whence happen Defluxions attended with very fatal Accidents.

Of the Difference of Luxations.

Different
Sorts of
Luxations.

The Kinds and Differences of Luxations are derived from several Things, *viz.* from the Articulation of the Bone; from the Place it settles

tles in when dislocated, from the Causes capable of disjoining it; the Time it has been so; and lastly, from the Distempers and Accidents that accompany Luxations.

From the Species of the Articulation.

Some happen to Bones join'd by a *Genou*, the others to those joined by a *Ginglymus*; to which may be added the opening of the *Sutures*, the displacing of the Teeth, and the Separation of the Bones joined by a Cartilage.

Species of
the Arti-
culation.

From the Place where the Bone settles when dislocated.

Luxations are compleat, when the Bone is forced out of its Cavity; and incompleat, when it rests upon the Edge of it, or else if there are divers Heads and Cavities; 'tis also called incompleat if one of the Heads lodges in the neighbouring Cavity; as when the external *Condyle* of the *Femur* slips into the internal Cavity of the *Tibia*.

Place
where
the Bone
settles.

As to the Place, one may again say, that the Luxation is internal, when the Bone is driven inwards; that it is external, when 'tis forc'd outwards; that 'tis upwards, when the Bone is thrust upwards, and downwards, when fallen downwards: And they compound these Terms when the Situation is combined, as when the dislocated Bone has taken a Diagonal, equally near to the inward and upper, or to the inward and lower Part, and so of the rest.

Remark.

of

Of the Causes of Luxation.

Causes. There are two Sorts of Luxations, the one proceed from internal Causes, the other from external.

Of Luxations proceeding from internal Causes.

Internal Causes. Some are produced by the Convulsion of the Muscles, others by the weakness of the Ligaments, some by the Palsy, together with the Weight of the Body, or of the Limb only, and others again by a ferous Matter, whereby the Ligaments are sodden and relaxed. There are some that are caused by the *Sinovia*, which forces the Head of the Bone out of its Cavity, and others that happen from the swelling of the Bone it self, as one sees in Rickety Persons, or such as live in fenny Places, or work in Lead, Quick-silver, and other Mines.

There are Six.

Of the Difference of Luxations, derived from the Diseases and Accidents attending them.

Luxation. Simple. Compound. The one are called Simple, because not accompanied with any grievous Distempers or Accidents; others are Compound, because several Bones happen to be dislocated; and such as are attended with Imposthumes, Wounds, Ulcers, Fractures, insupportable Pain, Fevers, want of Sleep, Convulsions, or the Palsy, are termed complicated.

Complicated.

Of the Causes.

'Tis necessary to examine the Causes of Luxations, which were mentioned in speaking of the dif-

different Kinds of them: I will begin by the first of the internal Causes, that is, permanent Convulsions.

'Tis easy to conceive, that if the Muscles which extend a Part, remain long contracted, those which are destined to a contrary Motion, being no longer able to keep it in an *Equilibrium*, the Head of the Bone must be forced towards the relaxed Muscles, and the Limb will be driven on the contrary Side by the Muscles that are convulsed, as is often seen in Cramps.

Explication of the Causes.

Permanent Convulsions.

The Weakness of the Ligaments, the Palsy, and the Weight of a Part, are great Causes of

The Palsy.

Luxations: For Example, if the Ligaments that join the *Humerus* with the Shoulder are relaxed, or the Muscles, that move the Arm, paralitick, the Weight of the Part will force the Head of the *Humerus* out of the Cavity of the Shoulder, because the Ligaments can no longer withhold it, nor have the Muscles Strength to sustain the Arm.

'Tis not to be wondered at if the Bones are dislocated, when a ferous Matter overflowing, drenches and relaxes the Ligaments that serve to strengthen the Joint, altho' the Muscles are not paralitick; because that the latter are not always contracted, and the Weight of the Limb acts at all Times.

Relaxation of the Ligaments.

It's observable, that the Ligaments of the Joints serve, together with the Muscles, to maintain the articulated Bones in their right Position; and that they succeed each other in this Office, as it were to relieve one another, not being always contracted together; for which Reason there happen Luxations by the Relaxation of the Ligaments, tho' the Muscles are sound; and in the Palsy the same falls out, tho' the

Remarks.

the Ligaments retain entirely their elastic Force.

The Si- The Redundance of the *Sinovia* will force the
novia the Bones from their Sockets by little and lit-
Cause of tle ; because in Proportion as this Liquor
Luxation. increafes, it removes the Head of the Bone from
its Cavity, which is the Cause of Luxation,
and often of an *Anchilofis*.

Extern al That Strainings, Blows, or Falls, fhould caufe
Caufes. Luxations, is not at all extraordinary ; 'tis feen
every Day ; but it hardly ever happens but
when the Limbs are at a Diftance from the
Body, as we fhall remark in the fequel of this
Discourfe.

Of the Diagnostick Signs.

Diagno- Thefe Signs are common or proper.

ftick. The common are thofe which are met with
Common. in all Luxations ; and the proper are thofe by
Proper. which we diftinguifh every Species.

The common Signs are Pain, and the Weak-
nefs of the Limb. The proper ones are the
Hollow that is found at the Place from whence
the Bone is forced, and the Rifting that is ob-
ferved where it has fettled ; the Limb is longer
or fhorter, and turns to one Side or t'other, ac-
cording to the different Kinds of Diflocation,
which fhall be explained at full Length, when
I enter upon an Enumeration of the Signs by
which we know a compleat Luxation from an
incompleat one, and thofe which proceed from
an internal Cause from thofe which happen
thro' an external one, whether upwards, down-
wards, *Anterior* or *Posterior*.

Common 'Tis obferved that the Pain and Weaknefs of a
and equi- Limb are not only common, but equivocal Signs.
vocal There are Perfons fo fufceptible of Pain, that
Signs. the

the least is intolerable to them ; and then the Weakness, or Inability of moving the Part may arise from the Fear of suffering. On the other Hand, there are People who bear Pain with Patience, and will let the dislocated Parts be moved without complaining.

Of the Signs of an incomplete Luxation.

1. The Joint is raised higher than it should be. Signs of an incomplete Luxation.

2. The Limb hardly changes its Figure or Length.

3. The Part is almost indifferent ; or, to speak more properly, is not more disposed to move on one Side than t'other, which is not so in a complete Luxation.

4. The Pains are more acute than in a complete Luxation. Let us give the Reasons for all these Things.

The Joint appears higher than it ought to be, because the Head of the Bone is raised up on the Side of the Cavity, which makes it take a Sally outwards. Explication of the Signs.

The Limb hardly changes its Figure, or Length, because the Head of the Bone scarcely removes from the Center of the Cavity ; or, at least, a great deal less than in a complete Luxation.

The Part is not more disposed to move on one Side than t'other, because the Muscles are almost equally extended, seeing that the Removal of the Head of the Bone is almost at an equal Distance from their Origin.

The Patients Pains are much more sharp than in a complete Luxation ; especially when the Sides of the Cavity are high, because the Ligaments and Muscles suffer a greater Extension when

when the Head of the Bone rests upon the Side of its Socket, than when 'tis entirely out ; it is not altogether the same if the Sides of the Cavity are less raised.

Of the Signs of Luxation proceeding from internal Causes.

Signs of
internal
Causes
mention-
ed by Au-
thors.

1. The Part is unsteady as if it hung by a Thread, because it is always paralitick, which is sometimes the Cause, and sometimes the Effect of the Luxation.

2. A void Space is felt about the Articulation, between the Head of the Bone and the Hollow that receives it, which is the Consequence of the Palsy, the Relaxation of the Ligaments, and the Weight of the Part affected, which endeavours to separate the articulated Bones from each other. 3. The Bone is easily reduced, and as easily displaced again ; because the Ligaments and Muscles having lost their elastick Faculties, can neither resist the Operation of reducing the Bone, nor retain it in its right Position, when replaced.

The Part is longer than usual, because neither the Muscles nor Ligaments perform their Office ; wherefore the Limb is drawn out by its own Weight.

These are the Signs given us by Authors, but they are not sufficient, since they are only to be met with in the Luxations of the upper Extremities proceeding from internal Causes, thro' the Palsy of the Muscles, and the Relaxation of the Ligaments. Wherefore it must be shown, that they seldom are found in the lower Extremities, and moreover, that there are some Signs that show when the Luxation is caused by the Palsy, others when it proceeds from Convulsi-
ons,

Other
Signs.

ions, and others again when it is from the Relaxation of the Ligaments, or the Redundance of the *Sinovia*.

I say that all these Signs are only met with in Luxations proceeding from internal Causes, that affect the upper Extremities, thro' the Palsy of the Muscles, together with the Relaxation of the Ligaments; because that then nothing but the Weight of the Arm can remove the Head of the Bone, and make the Limb longer. 'Tis not the same with the lower Extremity, which serves to sustain the Body, and is not pendant, wherefore it must rather be shorten'd than lengthen'd, if the Weight of the Body acts upon it. Remark.

The Signs of the Luxation's being caused by the Palsy are. 1. The leanness of the Part, which often feels but little Pain, and the Bone is easily reduced. 2. The Difficulty of containing the Bone when replaced. 3. The Limbs that are dislocated by the Relaxation of the Ligaments, without the Muscles being paralytick, are not lean; they are sensible of Pain, the Joints swell, the Limb is shortened and liable to all the Distortions which the Contraction of the Muscles causes in other Luxations. Signs of the Palsy, and relaxing of the Ligaments.

Besides, less Strength is requisite to reduce these, than those which proceed from external Causes; neither need the Bandages that contain them be so strong, as we shall observe in treating of them severally. Remarks.

Luxations proceeding from an internal Cause produced by Convulsions, are attended with Pain, both when they commence, whilst they are compleating, and when compleated. They are very hard to reduce, as shall be shown in particular in the Course of this Work. Convulsions, the Cause of Dislocations.

'Twill

Signs of the Superfluity of the Sinovia. 'Twill be known that the Luxation is caused by the Superfluity and Coagulation of the *Sinovia*, when 'tis impossible to make the Bone re-enter its Cavity, although it is easy to bring it both to the Edges of it, and beyond them: Besides, one shall be sensible of a Resistance in endeavouring to force its Entrance, and one shall hear a Noise like that which is made by kneading Fuller's Earth.

The Swelling of the Bones the Cause of Luxations. Children that have the Rickets are subject to Luxations, caused by the swelling of the Heads and Cavities of the Bones; because the Heads grow larger, and the Cavities are filled up by the Tumour at one and the same Time, whence there is no longer any Proportion between the one and the other, and the Bones separate and dislocate. The same Thing happens in Luxations that proceed from Strains in hard Labour.

Observation. A Child had its Thigh disjoined by the ill Management of a Midwife, in bringing it with the Feet foremost; which was not perceived till five Years afterwards. They advised with me to know my Opinion, which was, that this Incurable Luxation was absolutely incurable, and that Luxation. for two Reasons.

First Reason. The first is, its long standing: The fresh ones of a Month or two sometimes recover, but one ought not to hope to cure one of five Years.

Second Reason. The second Reason why this Luxation was incurable after five Years, is, that at the Birth, all the bony Parts are so tender that they grow quickly, and with Ease: In growing they acquire Hardness, and either don't retain, or don't take their usual Shape, but by adapting themselves to each other: Wherefore the Head of the *Femur*, after five Years, is no longer of a round Figure, and the Cavity of the *Ischion* must be

be worn out, by Reason of its not being used ; so that these two Parts which must grow at the same Time, not being able to mould themselves to each other, and preserve the Relaxation that ought to be between the Pieces that compose this Articulation, it is impossible to replace them in their natural State. 'Tis certain, that the Head of the *Femur* had formed it self a new Residence, at the Expence of the Parts near the strange Place where it has settled.

'Tis even reasonable to think, that if at present this Thigh should happen, by any violent Fall, to be forced from the strange Place where it is, the Surgeon would be obliged to re-instate it in the same : For altho' a Stranger, five Years Residence therein has naturalized it thereunto, and the Cavity of the *Ischion*, formerly its natural abode, would then be a strange Place to it. Reflection on.

Signs which shew the Place where the Bone is settled.

The Bones dislocate upwards, downwards, forwards, or backwards ; and each of these Luxations is distinguished by the following Signs. Different Signs.

'Tis a general Rule that when a Bone is disjoined, the End of the same Bone which is opposite to the Luxation will be on the contrary Side to where the Head is. If the End of the Bone opposite to that which is disjoined turns outwards, the Dislocation is inwards ; if it turns inwards, the Luxation is outwards ; and so of the rest, except in some Luxations proceeding from internal Causes, as has been just observed. Of general Rules.

What I have said generally happens only by Reason of the Head of the Bone's removing from, or drawing near to the Muscles that move the Bone.

Explana-
tion.

In order to comprehend this, it is to be observed, that in their natural State, the Muscles of the Articulations are almost equally distant from the *Fulcrum* of the Bone: But if the Bone dislocates, it draws near to the Origin of some Muscles, and removes from that of some others: Those to which the Bone approaches must be relaxed, and the others very much stretch'd. The first will be (as one may say) without Action, which will give the others the Opportunity of drawing the Part on their Side; consequently if the Head of the Arm-Bone is forced inwards, the Elbow will be turned outwards.

There are besides an infinite Number of Signs, but as they are peculiar to each dislocated Part, I shall only mention them in the particular Account of each Luxation

Of the Accidents.

Acci-
dents of
Luxati-
ons.

The Accidents that attend Luxations are, Pain, Loss of Motion, convulsive Twitchings, the Palsy, Restlessness, Inflammations, Gangrenes, Rattling, *Anchiloses*, Numbness, and others, which shall be explained in the Sequel.

Aphorisms of Use in prognosticating.

1. The Luxation of a *Ginglymus* is more dangerous than that of a *Genu*.
2. The compleat Luxation is more dangerous than that which is incompleat.

3. A Luxation from an internal Cause is harder to be cured, than that which is from an external one; and very often 'tis incurable thro' the Difficulty of destroying the Cause.

4. Old Dislocations are harder to reduce than those newly contracted.

5. Those which are attended with Fractures, *Anchiloses*, Imposthumes, Wounds, Ulcers, and other Diseases, are very dangerous; because each of these Distempers requires a particular Cure, the which is, in itself, rendered difficult by the Luxation that accompanies it.

6. The Articulations that have many Muscles are difficult to be dislocated, or reduced, because the Stroke or the Fall, must force the Muscles to be able to displace the Bone, and one must get the better of their Resistance, and extend them in order to reinstate it in its Socket.

7. The Limbs of young People, and Women, dislocate more easily than those of People in Years, and strong Men; because the Muscles have less Force in the one than in the others.

8. The more difficult a Limb is to luxate, the more painful its Dislocation is; because the Ligaments, Tendons, and Muscles, suffer a more violent Distension.

9. If the Patient feels great Pain in the Joint, after the Surgeon has used his Endeavours to reduce the Bone, 'tis a Sign the Reduction is not perfect, that some Tendons or Ligaments have been stretch'd, or else that the Head of the Bone presses some Part of a Ligament between it and the Socket.

10. Luxations caused by the gathering of the *Sinovia*, are more difficult to cure, than those which proceed from the Relaxation of the Ligaments, by Reason that 'tis harder for the

Medicines to penetrate to the Joint where the *Sinovia* lies, than to the Sides where the Ligaments are.

11. The incompleat Dislocations in the Rickets vanish of themselves when the Bones of the Children unknit, provided they are hindered from walking excessively. The compleat Luxations are incurable.

12. When rickety Children fall, they are more subject to break their Limbs, than dislocate them; unless there be already some Disposition in them towards a Luxation, proceeding from an internal Cause; and this, by Reason that their Bones are soft, and bend, and have not Force to resist against the Articulation sufficiently to dislodge the Bone from its Cavity.

13. A Luxation caused by the Palsy or Convulsions, is a less troublesome Distemper than its Cause; it is easily reduced, and as easily displaced; so that the Bone is with Difficulty kept in its Cavity.

14. That which is the Consequence of the Palsy, is infinitely longer in curing, than that which proceeds from Convulsions.

I shall enter upon the Particulars of Prognostication when I treat of the several Sorts of Luxations.

Of the Cure of Luxations.

The
Cure;
3 Things
necessary.

A cura-
tive Indi-
cation.

Luxations indicate three Things for their Cure. The First is to reduce the dislocated Bone. The Second is to keep it in its right Place when reduced. And the Third is to correct present, and prevent future Accidents.

The first Indication is called Curative, because it precisely shews us what must be done for the
Cure

Cure of the Patient. Now what must be done is to reduce the Bone, which cannot always be brought about, because of the following Complications.

If there happen to be a Fracture, great Tension, or violent Contusion, it is impossible to reduce the Luxation. For Instance, if the Arm Bone were broken in the middle, and split at the Shoulder, one must absolutely give over the Luxation, because 'twould be impossible to make the Extensions necessary to reduce it, unless it be in the Case laid down in the Sequel.

A Counter-Indication.

When there is a Swelling caused by a violent Contusion, and not by the pressing of the Head of the dislocated Bone upon the Vessels, or other Parts; one must first of all endeavour to cure the Tension, Contusion, or Swelling; both because these Accidents are troublesome in themselves, and hinder the making of the necessary Extensions, and because they very often render the Knowledge of the Distemper uncertain and difficult. But if the Tumour happens thro' the pressing of the sanguinary Vessels by the Head of the disjointed Bone, it must be reduced as soon as possible, and by that Means the Swelling will cease.

A Counter-Indication.

Sharp Pain does not hinder the reducing the Part instantly, but when the strange Situation of the dislocated Bone is not the only Cause of it.

There are three Things to be done to reduce a dislocated Bone, *viz.* Extension, Counter-Extension, and the guiding the Bone into its Socket.

3 Operations in reducing the Bone.

We shall call the Motion that we make in drawing the indisposed Part to us, Extension, and we shall term Counter-Extension the Endeavours we use to draw the Part affected towards

Explanation.

An In-
struction
concern-
ing these
two Ope-
rations.

wards the Body, or to with-hold the Body, for fear it should yield with the Part affected whilst one is drawing it to extend it.

To be fully instructed in these two Operations, one must know why they are done, with what they are done, what must be observed in doing them, and lastly, the Signs or Tokens that they are successfully finished.

The Extension and Counter-Extension are made, in order to bring the Head of the Bone even with its right Cavity, to the End that it may be easily guided thereunto.

The
Means
that are
made Use
of.

These two Operations are performed either by our selves, or with the Help of Servants; and we make Use either of the Hands alone, of Straps, or Machines.

Different
Cases.

They are done by our selves, in reducing the lower Jaw, the Fingers, the Wrist, the Foot, and sometimes the Elbow, or even the Arm or the Thigh, when they are reduced by the Heel. On all other Occasions one must have Assistants, who make Use of their Hands alone when a slight Extension suffices; of Straps when a stronger is requisite; or lastly of Machines, when neither the Hands nor the Straps are sufficient.

Circum-
stances to
be obser-
ved.

The Circumstances to be observed in making the Extensions, and Counter-Extensions are,
1. That the Body be with-held, drawn, or thrust upwards, by a Force equal to that wherewith the Limb is pulled downward, otherwise the weakest would give Way to the strongest, and the Extension would be imperfect.

2. The Force which draws to make the Extension and Counter-Extension, must be applied, as much as possible, to the Parts themselves that are dislocated, otherwise 'tis unprofitable, and oftentimes hurtful. For Instance, if the Lux-
ation

ation of the Arm were to be reduced, one must pull the Arm it self, and not the *Cubitus*; thrust back, or with-hold the Shoulder, and not the Body, because that Part of the Force would be lost in the Articulation of the Elbow, and in the Adhesions of the *Omo-plata*; and one might make such violent Extensions, as would hurt the Ligaments and Muscles of those Parts, which might not have Strength enough to resist,

3. The Force both in the one and t'other of these Operations, ought to be proportioned to the Distance of the Head of the Bone from its Cavity, and to the Strength of the Muscles which hold them back; for less Force is requisite to draw a Bone towards its Socket, when 'tis upon the Edges of it, than when 'tis three or four Fingers Breadth from it. One must also pull with less Force when reducing the Arm, than when reducing the Thigh, because the Muscles of the Thigh are stronger than those of the Arm.

4. The Part must be so placed that the Muscles may be equally stretched, without which, those that are most contracted would make too much Resistance, and diminish the Force of the Extension; besides that they might be torn.

5. The Extension must be made by degrees, for Fear of breaking the Muscles by a too strong, and too quick Motion.

6. Care must be taken of the Parts upon which the Straps or Machines are fastened, which pull or thrust, that one may avoid Contusions, Excoriation, Scars, or Issues in those who have them.

To avoid tearing the Parts, as may happen, one must strengthen them with Bolsters, and

Compresses ; which must be particularly observed on both Sides of the Passage of the Vessels

7. The Straps must be placed nearest to the *Condyles*, or other Eminences that are capable of retaining them, by giving them a good Hold, because they would slip, and be of no Effect, if they were placed elsewhere.

They must be bound strongest upon such as are Fat, that they may approach the nearer to the solid Part of the Limb, otherwise the Fat would hinder the Steadiness of the Strap, which would slip with the Fat, over the common Membrane of the Muscles.

First Sign
that the
Extension
is made.

The Signs which shew us, that the Extension is sufficient, are, when the Straps that draw contrary-ways, are distant enough from each other.

Second
Sign.

When a dislocated Part is bound and fasten'd, ready to be extended, the Muscles appear, because they swell, and seem as if preparing to draw to oppose the Efforts of the Chirurgeon, or his Machines.

Third
Sign.

If during the Time of the Extension, the Muscles sink, and lengthen, 'tis a Sign that the Bone is in the right Way to its Socket, from whence it is forced, and that the Extension is sufficient.

The guiding the
Bone into
its Place.

When the Muscles are found to be sufficiently lengthen'd, the Bone is guided into its Socket, or Cavity, by the Hands or Machines, by slackening gently those which draw, that the Bone may replace itself.

Observations.

It is not always necessary to thrust it, as is recommended by the Ancients ; for the Muscles and Ligaments themselves which have not been too much forced, will contract when they are no longer stretch'd, which makes the Noise that is heard.

If

If the Bone were to be left to the whole working of the Muscles, one should run the following Risques.

1. If there is a cartilaginous Border, it may be beaten down when all the Straps are let go together, which may cause an *Anchilosis*, or at least render the Motion very difficult, this would happen particularly in a Luxation of the Thigh.

2. If the Swiftnefs of the Return of the Bone should not break the cartilaginous Border, the Head of the Bone would cause a great Contusion in the Cartilages on every Side.

It is therefore necessary to guide the Bone gently, at least till one is assured that it takes the right Way to its Socket, into which one has sometimes a great deal of Trouble to make it enter, and at other Times it will re-enter of its self, when one takes the right Way.

The Way by which one must guide this Bone.

This Way is not always the shortest that the Bone can take to re-enter its Cavity, but 'tis that by which 'tis found that 'twas forced out of it, and one is obliged to follow this Track, even if it should not be the shortest, both because it is already beaten by the Head of the dislocated Bone, and because it leads to the opening of the *Sacculus Ligamentosus*, which has been made by the Sally of the Head of the Bone. If this beaten Track is not followed, another must be made both to the great Trouble of the Operator, and Pain of the Patient: Besides, the Head of the Bone coming to its Cavity by a new Way, and finding no Aperture in the ligamentary Tunicle, carries it along with it into the Socket, which hinders the Reductions being exact, and causes Pains,

Observation upon the Head.

Tu-

Tumours, Inflammations, Defluxions, and other melancholy Accidents.

The other Causes which render the introducing the Bone difficult, are the Glears which gather in the Socket, (which happens in old Luxations) the Border of the Cavities being broken or over-turn'd, or lastly its being fill'd with Air.

If the Edge of the Ligament is not broken, the Air will oppose the introducing of the Bone, because the Head will close in so justly with the ligamentary Circle, that the Air will not be able to get out, but by a violent Impulsion of the Head of the Bone, and 'tis this Air, so press'd and forc'd out, which makes the Noise that is often heard in reducing Luxations, one may even be assured that without it the Percussion or Clashing of two Bones would not be perceptible to the Ear.

The
Means to
retain the
Bone in
its Socket.

Observa-
tions.

The second Thing in which the Cure of Luxations consists, is to retain the reduc'd Bone by the Application of Bandages, and the Situation of the Patient: The Application of Bandages is less necessary in Luxations proceeding from external Causes, than in those produced by internal Ones; because in the former the Muscles retain the Part better than all the Bandages whatsoever; but they are absolutely in the latter, especially such as happen thro' the Relaxation of the Ligaments, or the Palsy; and there is the same Necessity for them in old Luxations from external Causes, where a Palsy has seiz'd upon the Patient, or the Part is inclin'd to an *Anchilosis*: The Bandage also must be a little harder bound than that which is made Use of in Lux-

Luxations, that are recent, and proceed from external Causes, because that in most part of these the Bandage only serves to keep on the Bolsters, and Medicines that are laid upon the Part.

These Bandages are made with Compres-
ses, and Swathes roll'd, which are longer or
shorter, according as 'tis necessary to retain
the Bone in its Socket, or only to keep on the
Bolsters and Defensives that are laid upon the
Part affected. The Dress-
ings.

By the Situation, is meant, the Manner of
placing either the whole Body, or the Part
alone, in a convenient Posture. The proper
Situation of the Body, in all Luxations of the
Trunk, or lower Extremities, is to be laid
down, but it is not requisite for the Patient to
keep his Bed in Dislocations of the Jaw, and
the upper Extremities. The pro-
per Situa-
tion of
the Body
and the
Part.

To place the Part right, Care must be ta-
ken that no Muscle be constrained, and that
the Fluids be not hindered from circulating ;
to this end one must have regard to five Things.

The first is, that the Limb neither be too
bent, nor too much extended : The Muscles
are in Contraction either to bend, or stretch
out, wherefore one must give the Part a mid-
dling Situation, in which it may be equally
contracted and extended. The Con-
dition of
the Situa-
tion.

The second is, that the Limb be equally sup-
ported ; if any Part is not sustain'd, the Muscles
strain to bear it up, and supply the want of the
Stay, which causes sharp Pains.

The third Thing to be taken Care of, in
placing well the Part affected, is, that the Ben-
ding downwards does not hinder the Return of
the Fluids : If the Extremity of the Limb that
is hurt should hang too low, there would
hap-

happen a Tumour, Tension, Defluxion, or Imposthume.

The fourth is, that what serves to support the Part must be soft, to the End that the Patient may not be incommoded, which would oblige him to Motions that may be very hurtful.

The fifth Thing is, to secure the Part indisposed, which depends upon the Solidity of the Bed in Luxations of the Trunk, and inferiour Parts, and upon the Regularity of the Scarf in those of the upper Parts; and one must observe to lay the Patient in such a Manner, that he may be conveniently dress'd, wherefore one must place the Part that's indispos'd on the outer Side of the Bed.

The Cure
and Cor-
rection of
Acci-
dents.
Inability
of moving
Pain,
the Ac-
cidents
that at-
tend Lux-
ations.

The third essential Thing in the Cure of Luxations, is to destroy the present, and prevent future Accidents. I shall treat of each of these; I begin by Pain, and Loss of Motion.

I have said, in speaking of the Signs in general, that Pain and Loss of Motion, must not be always looked upon as certain Signs of Luxations, but they are always the Accidents that attend them. Pain is not a Sign; there are some who disquiet themselves for a very Trifle, and others who are patient altho' they suffer very much; and 'tis not to be wondered at if some Persons are in great Torture, without there being any Dislocation; and that others have Luxations without being sensible of any great Uneasiness: 'Tis easily conceived also, that a Person very sensible of Pain will avoid all Sorts of Motions that may excite it, and that one must not confound the Inability of moving, which proceeds from the displacing of the Bones, with that which only comes from the

Means of Fear of Suffering. The Pain and Inability of moving

moving the Limb, which always accompanies removing
Luxations, usually ceases when the Bone is re- the Pain
duced: I say usually, because sometimes both and Ina-
the one, and the other, remain, altho' the Bone bility.
is reduced; by Reason that the violent pulling
may cause an Extension, or Ruptures of the
Fibres in the Muscles, and nervous Parts.

There are often Contusions so strong, as to Contusi-
cause Tumours and painful Swellings: In that ons.
Case we make use of Bleeding, and Narcoticks,
and we apply Cataplasms, Liniments, Fomen- Their
tations, and other topical Remedies, to the Part, Cure.
which ought to be Emollients, Anodynes, and
Dissolvents.

Convulsive Motions are caused by the stretch- Convul-
ing of the Nerves, or nervous Parts; but they sive Mo-
generally cease when the Bone is reduced. tions.

A Fever often happens thro' acute Pains, of Fever.
ten it does not appear till the third or fifth Day.
This last is excited by an Irritation caused by Its Cause.
some Matter infiltrated, or diffused; or by an
Inflammation, which is always attended with a
Fever. The whole is cured by great Bleed- The
ings, Diet, and other general Remedies; one Cure.
must even lay such Anodynes and Narcoticks
upon the Part, as won't close the Pores, and
they may likewise be given inwardly.

The Gangrene does not happen to the dislo- Gan-
cated Part, but always below it, unless there grene.
be a Wound. It is caused by the Compression The
of the Nerves, and Blood Vessels, as well as Cause.
the Palsy, which is seen in the Luxations of
the *Vertebrae*, and every where else where the
dislocated Bones press upon the Vessels, and
hinder the Distribution of the Blood, and ani-
mal Spirits.

The best Way of avoiding it, is to make the The
Reduction; but if the Bones have been long Cure.
dislo-

Another
Gan-
grene.

dislocated, or the Vessels bruised in reducing them; both these Causes interrupting the Circulation of the Blood, may occasion a Gangrene that requires a particular Cure, which is amply described in the Chapter of the Luxation of the *Vertebra*.

Rattling.

The Rattling which follows Luxations, is either caused by the Want of the *Sinovia*, or by too great Abundance of it. 'Tis a Noise that is made in moving the Limb, either by the rubbing of the Cartilages that are too dry, or by the *Sinovia*'s owzing in too great Quantity; or perhaps also by the Air which is joined with it.

The
Cure.

If there is not a sufficient Quantity of the *Sinovia*, one must anoint the Articulation with penetrating Oil, and apply emollient Fomentations to supply the Defect of it.

If the Rattling proceeds from the Excess of the *Sinovia*, one must move the Part, and apply to it spirituous Dissolvents. When in Spite of all these Precautions there happens an *Anchilosis*, it must be managed as shall be mentioned in speaking of that Distemper.

If there
is a
Wound.

If there chances to be a Wound, a Bandage must be made, as in a complicated Fracture, to the End that the Part may be kept in its right Position without moving. This Bandage must not be tight, because that in both these Diseases it only serves to keep on the Remedies that are applied to the Part.

If there
be an Im-
posthume,

If there be an Imposthume, it must be managed according to its Age and Termination; and if it suppurates, it must be opened in good Time without waiting for its Maturity, because the Matter by its Stay may hurt the Parts about the Joint, and even enter into it, which would cause a troublesome Distemper.

When

When the Head of the Bone is forced out with such Violence that it breaks the Ligaments, Tendons, and Skin it self, it must be set in again as soon as possible, and the Wound be dressed according to Art: But for the most Part there comes a Gangrene, and one is obliged to have Recourse to Amputation.

A great
Complication.

When a Fracture and Luxation meet in the same Bone, one must strive to reduce the Luxation, and then reduce and dress the Fracture. If 'tis impossible to do the first, which happens when the Fracture is near the Articulation, there not being then Hold sufficient to make the Extension, one must deal with them after the following Manner.

Fracture
and Luxation.

The Fracture must be reduced, and Defensives laid upon the Luxation; and after that Dissolvents and Liquefyers, to the End that the Fluidity of the *Sinovia* may be preserved; and when the *Callus* of fractured Bones is formed, one must make the Extension to reduce the Dislocation. This Method does not always succeed, but there is no other; the only Risque is, that the Luxation may not be reducible after so long a Time, which does not always happen, because that Dislocations are reduced and cured after six Months, a Year, and more, and the *Callus* is firm and hard before that Time.

The
Cure.

To avoid the Coagulation of the *Sinovia* about the Articulation, during the Cure of the Fracture, and hardening of the *Callus*, Cataplasms should be laid upon the Joint, made with the Pulp of emollient and dissolving Herbs; and when the Bone begins to be solid enough at the Place of its Fracture, one must move the Articulation by little and little, increasing the Motion every Day, in Order to preserve the

Precautions.

Sino-

Sinovia in its natural Fluidity, and make the Reduction successfully when the *Callus* is strong enough to bear the Extensions.

The
Cure of
Luxations
proceed-
ing from
internal
Causes.

By Con-
vulsions.

Luxations proceeding from an internal Cause are to be differently managed. If the Convulsion of the Muscles has forced the Bone from its Socket, the Luxation must immediately be reduced and retained in its Place, whilst one cures the Convulsions, which is done differently according to their Causes, of which we shan't speak in this Treatise.

If the Ligaments are relaxed, and the Muscles Paralitick, the Bone must be reduced and retained by a Bandage, and the Situation of the Patient, and Part indisposed, applying several Times a Day spirituous and aromattick Fomentations, after having chafed it with hot Linnen to open the Pores, both to facilitate the Penetration of the topical Remedies, and to give Room for Perspiration.

The Pal-
sy.

In short, one must observe the *Regimen*, and use the general Remedies; and, as for the Palsy, it requires a particular Cure, but this is not the Place to treat thereof.

The Si-
novia.

If the *Sinovia* has increased to such a Degree, that it has forced the Bone from its Place, the utmost must be done to set it again, and keep it strongly in. On this Occasion a Bandage is used, which pressing the Head against its Socket, forces the *Sinovia* towards the Circumference, and bringing it nearer the Surface of the Body, consequently exposes it the more to the Operation of the Topicks; whence 'tis more easy to dissolve, and dissipate it by Liquifyers, and Dissolvents, laid upon the Part. One must besides at every Dressing, move the Head a great while in its Socket, so that it bruises and dissolves the Humours like a Pestle in its Mortar,

tar, and renders it capable of perspiring, or of re-entring into its Receptacles.

The Luxations caused by the Swelling of the Heads and Cavities of the Bones, are cured sometimes, when they are not compleat.

If the sick Person is Ricketty, you will find in the Treatise of the Rickets what Remedies are fit for him.

If the Tumour is caused by living in marshy Places, one must add to the Chirurgical Operations a *Regimen*, which must be hot and dry, as well as the Air into which the Patient should be removed.

Hydragogues agree perfectly well with it, and the Use of hot mineral Waters are also very beneficial.

If the swelling of the Bone proceeds from a scrophulous Humour, one must use such Remedies as are proper for the King's-Evil.

Mercurial Frictions are proper for those in whom the Swelling of the Joints is caused by the Virulency of Quick-Silver. I have seen this Remedy used, and with Success, upon a Gilder's Boy, who had his Leg almost entirely dislocated by Mercury. This makes me believe that the same might be used for the Cure of Miners, who are afflicted with Swellings in the Bones, and whose Joints are warp'd.

C H A P. II.

Of the LUXATION of the Head.

TH E Head has two *Condyles* on the Sides of the occipital Hole, which are received and jointed in the two oblique superiour Processes

cesses of the first *Vertebra*, which forms a GINGLYMUS with two *Heads*, and two *Cavities* limited by Ligaments that are short, strong, and cross.

The Motion of the Head. By this Articulation the Head can only bend and extend it self; it turns on each Side by the Means of the jointing of the first *Vertebra* with the second; seven or eight Pair of very strong Muscles serve to execute all these Motions.

Muscles. This Articulation, with the second *Vertebra*, belongs not at all to the Head, altho' by its Means it can turn to the Right and to the left; it is entirely formed by the first and second *Vertebra*, which is fastened to the occipital Bone by a very strong Ligament, that takes its Rise from the *Processus Dentiformis*, and inserts it self in the Fore-Part of the occipital Hole, which strengthens both the one and the other of these Articulations.

What passes by the Occipital Hole. The Occipital Hole, on the Sides whereof are the two *Condyles* which make the Articulation of the Head with the first *Vertebra* of the Neck, is that large Opening from whence issues the Continuation of the *Medulla Oblongata*, which passing thro' all the Holes of the *Vertebrae*, forms the Marrow of the Spine. The *accessory* Nerves, and the *vertebral* Arteries, pass also by the occipital Hole; but the *Carotides* and the *Jugulares* do not. Forgive me this gross Remark; I had never thought of it, if I had not read the contrary in a *French* Manuscript newly dictated. Errors of this Nature shew plainly that a Man ought to be perfectly acquainted with Things before he pretends to teach them.

A palpable Error.

'Tis almost impossible that the Head should dislocate from the first *Vertebra*; the second, third, and others are more easily disjointed; not that they are less fixed, but because they are more distant from the Head; and 'tis clear that

that the *Vertebra* are the easier put out, as they are more distant from the jointing of the Head, or of the Hip Bones. 'Tis for this Reason that those of the Loins are dislocated with greater Facility than the others, which shall be proved more at length. Besides, the jointing of the Head with the Neck is not made by the Means of the first *Vertebra* only, but the second is also strongly fastened to it. It may be added likewise, that the first will with Difficulty dislocate from the second, on Account of the *Apophysis Odontoides*, which serves to limit it; and because this *Apophysis* is restrained and fixed by two Ligaments, the one posterior, which hinders it from being overthrown backwards; and the other binds it to the anterior Part of the occipital Hole.

We will speak no more of the Causes, because we have particularized them very much at length in the general Account; nevertheless I can't forbear relating here a tragical Story which may be of some Use.

The only Son of an Artificer of six or seven Years of Age, went into the Shop of a Neighbour who was his Father's Acquaintance; in playing with the Child, he put one of his Hands under his Chin, and the other behind his Head, and lifting him up into the Air, told him, *he would shew him his Grandfather*, a mean and vulgar Way of Speaking. The Child was no sooner lifted off the Ground than he grew refractory, dislocated his Head, and died that Instant. His Father (who was immediately told of it) being transported with Passion, ran after his Neighbour, and not being able to overtake him, threw after him a Sadler's Hammer which he had in his Hand; the sharp End whereof pierced what is called the Pit of the Neck, and cutting

all the Muscles, and penetrating the Space between the first and second *Vertebra* of the Neck, cut the Marrow of the Spine, whereof he expired the same Hour. Thus these two Deaths happened almost after the same Manner.

This Way of playing with Children is but too common with the Vulgar, because they don't know the Danger to which they expose them.

Perhaps also, the Child had not died if he had not been so refractory; for I do not at all doubt but his struggling was one of the principal Causes of the Dislocation of his Head.

'Tis observed, in almost all hanged Persons, that the first *Vertebra* of the Neck is entirely separated from the second. It may be even the greatest, and most proper Cause of their Deaths.

This Observation makes me believe the Head and first *Vertebra* of the Neck are very difficult to be parted, and that generally when the Head is thought to be dislocated, 'tis nothing else but a Luxation of the first *Vertebra* from the second.

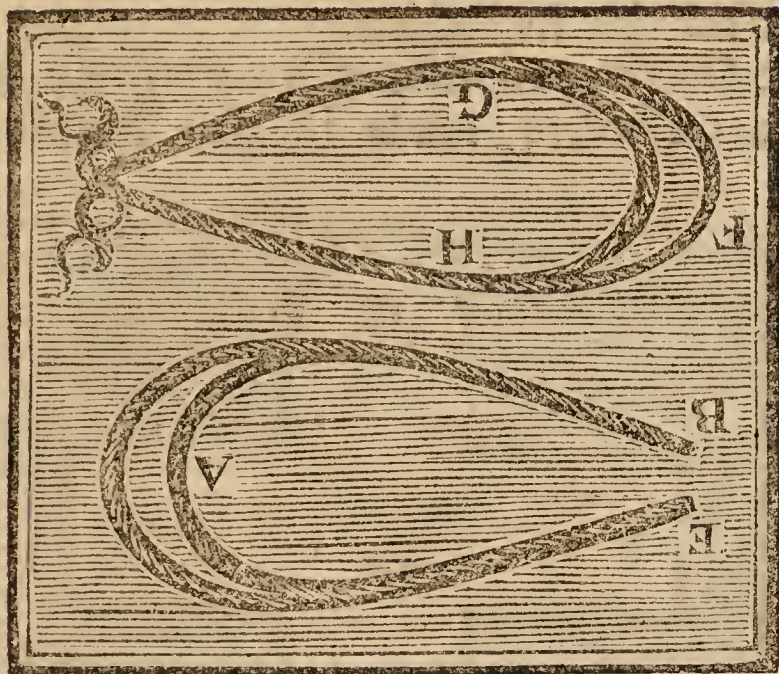
Signs and Prognosticks.

Signs.
Prognosticks.

The Signs are evident, and very fatal, they don't continue long, because the Patient dies either by the Compression, or tearing off the Trunk of the spinal Marrow, if the Luxation be not timely reduced.

I fancy 'tis not impossible to reduce a Luxation of the Head, especially if 'tis not compleat.

The Reduction must be made with a Strap that has a slit in the Middle, as 'tis represented in this Figure.



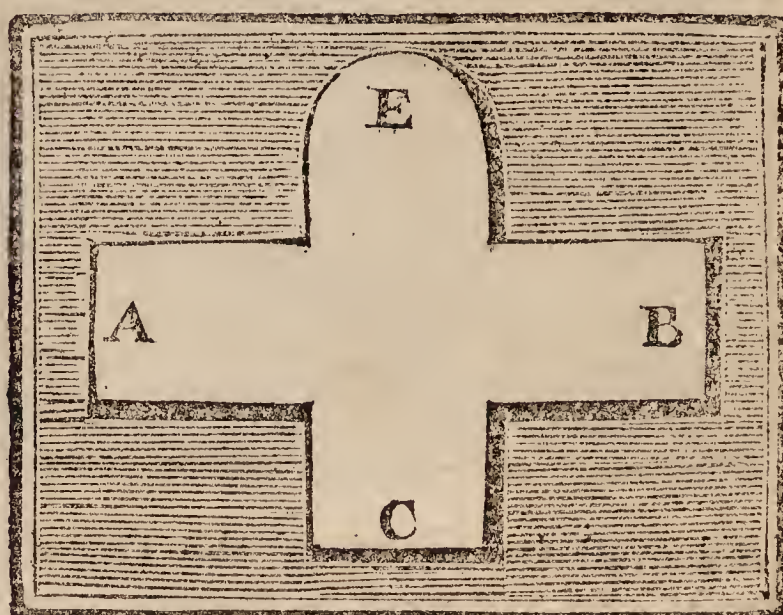
The Head must be put thro' the Opening (A) the Sides of the Slit must be placed, one under the Chin, the other behind the Nape of the Neck, and the Ends (B) (E) above the Ears; after which they must be joined in the Shape of a Handle, upon the Crown of the Head, where the Force must be applied to pull.

There must be another longer Strap, cleft in the same Manner, as at (F) in the Slit whereof the Head must be put, leaving the Sides upon the Shoulders of the Patient; and passing the two Ends (G) (H,) one along the Spine, and the other the whole Length of the Breast and Belly, in the Shape of a Scapulary. This done, the Ends must be tied together between the Thighs, a Foot below the *Pudenda*; then passing another Strap thro' the joining of this, it must be fastened to a fixed Point in such a Manner, that the Patient being laid upon his Back, the Strap is pulled by the Hands, or Machines, whilst the lower Strap resists at the Point to which 'tis fixed, which makes the Extension, and Counter-Extension: Then the

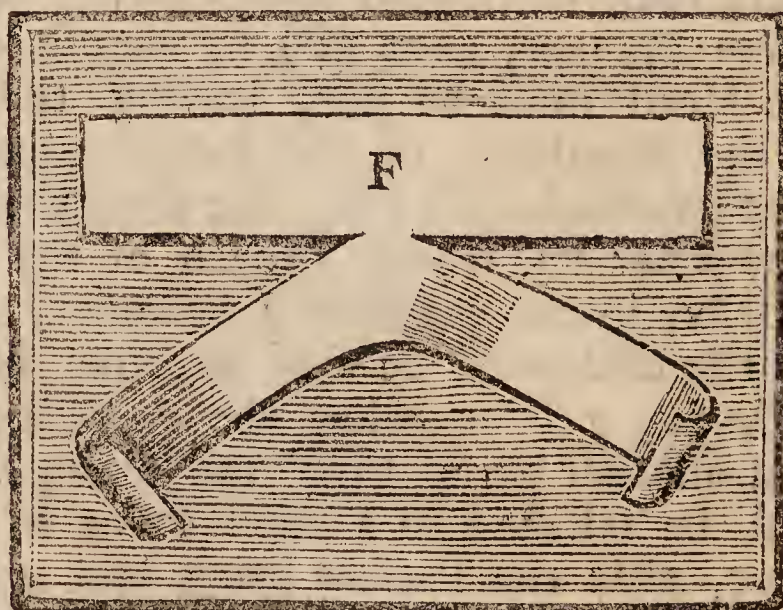
Operator should take Care at the same Instant to thrust the Head on that Side which is most proper for the Reduction.

The
Dressing.

The Dressing consists of a Compress covered with a Defensive, made in this Figure.



The Parts (A) (B) fold round the Neck; the Part (C) hangs down the *Vertebrae* of the Neck to the Back; the Part (E) ascends, and extends it self upon the Occipital.



The whole is kept on by a Sling (F) with four Tails; two are wrapt round the Neck, and the other two meeting at the Forehead, are fastened

ed round the Head. The middle of the Sling is placed at the Nape of the Neck; the Patient is laid upon his Back, with his Head very high, leaning upon a Cushion, hollowed in the Middle, and raised on the Sides, to serve as a Support to the Sides of the Head, like Junks.

One must bleed plentifully every three General Hours, first in the Arm, and afterwards in the Remedies. Foot; this must be repeated more or less, according to the Nature of the Hurt, and the Strength of the Patient. In the Beginning, the Particular Remedies. Juices of Bugloss, Borage, and Lettice are used; three or four Ounces may be given every four Hours, and at Intervals, Broths, with two Drachms of *Syrupus e quinq; Radicibus*, when there is no Fever: An Infusion is also given of the *Swiss* Vulneraries, especially the Cephalicks, the Belly is kept open by Clysters, and the Patient, and Assistants, must observe a perfect Silence.

C H A P. III.

Of the LUXATION of the Under Jaw.

TH E under Jaw is jointed by a double Luxation of the under Jaw. Its Structure. *Genu*, with the two Bones of the Temples, in each of which is a Cavity wherein the *Condyle* of the Jaw is received on each Side. There is a *Median* Cartilage between that which covers the *Condyle* of the Jaw, and that which is over the Cavity of the Temple-Bones. The Ligaments are weak, but the Muscles are very strong, especially those which raise the Jaw, and give it Motion for Mastication.

The Jaw dislocates before, either on both The Sides, or one only: Behind, it can neither be Kinds.

put out directly from Right to Left, nor from Left to Right.

The Im-possibility of some Luxations. The Roots of the *Apophyses Mastoides*, and the hollow of the long Canal of the Ear, hinder the Luxation behind.

Explanation. The bony Eminence, whence the *Apophysis Stiloides* issues, hinders the Luxation of the Jaw on both Sides, either from Right to Left, or from Left to Right; insomuch that this Dislocation can only happen before, whether one *Condyle* alone, or the two are displaced. The Mouth must be open at the very Time of its Luxation, for as long as it remains shut, no such Thing can befall it; because the *Condyles* will always be turned on the Side that is opposite to the only Road they can take to dislocate.

Of the Diagnostick.

Signs of the Luxation on both Sides. When the Luxation is on both Sides forwards, the Mouth is open, the Patient can't chew, and the Cheeks are flatted; when one opens the Patient's Mouth he is in great Pain, he can't speak distinctly, his Spittle flows in great Quantity, and runs out of his Mouth involuntarily, and what is most troublesome is, that he can't swallow but with Difficulty, and the Bottom of the Throat is dry.

Explanation of the Signs. If the Patient can't shut his Mouth to chew, *Aqua pendente* says, it proceeds from the *Corone* of the Jaw's being come down from under the *Zygoma*, and not being able to re-ascend. The same Author says, that this only happens in great Luxations, when there is a considerable displacing of the Jaw, which may very well be: Nevertheless, I believe that it generally happens, because the *Condyles* slip forwards under the *Fulcrum* of the Muscles, and lie in a right

right Line from their Origin to their Insertion; infomuch that not being at a sufficient Distance from their *Fulcrum* when they contract themselves, they can only press the *Condyles* against the Basis of the *Cranium*, without being able to move them, which is easy to be conceived by those who have any Tincture of Mechanicks.

The Cheeks are flatted, because that the Sequel of under Jaw being displaced, gives an Oppor-^{the Ex-} tunity to the Muscles *Buccinatores* to lie level planation. within, whilst the *Masseter* and *Crotaphitis*, make a Sally outwards, because they are in Contraction, as we are going to observe.

The Patient is in great Pain when his Mouth is opened, because that the Muscles which shut it are stretch'd by the too great Distance of the Jaw, for which Reason, in endeavouring to open it more, one extends and pulls the musculous Fibres.

He can't speak, because the Lips can't meet, and the Tongue don't touch the Palate nor reach the Lips, which is absolutely necessary in the Pronunciation of Words.

The Spittle flows in great Quantity, and involuntarily; the first by Reason of the Compression of the salival Glands; and the second, because the Tongue can no longer send it back to the Bottom of the Throat to be swallow'd, and the Lips can't meet to retain it.

The Patient can't swallow, because the Tongue no longer touches the Palate, nor has any Motion backwards to send down the Food, or the *Saliva* into the *Oesophagus*.

The Bottom of the Throat is dry, both because the Air passes without modifying, and because the Spittle no longer moistens, by Reason that the Patient throws it out.

When

Signs of a
Luxation
on one
Side.

When the Jaw is only dislocated on one Side, the Mouth is not so open, the Chin is turn'd to the Side opposite to that which is displaced, the Teeth don't meet with those that are over-against them in the upper Jaw, and the Muscles are swell'd but on one Side ; all the other Signs agree.

Of the Causes.

The Cau-
ses.

The Causes are either internal or external, both the one and the other are specify'd in the general Account of Luxations ; to which one may add, that the Jaw must be open when it dislocates, because if it is shut, and forced from before backwards, the *Condyles* will meet with the *Apophyses Mastoides*, and the bony Canal of the Ear. If it is thrust on the Sides, the *Condyles* will be withheld by the Protuberancies, whence the *Apophyses Stiloides* have their Rise : If the Blow forces it from below upwards, they will meet with the upper Jaw, as has been said before, whence I conclude, that it can only be dislocated by a Blow that strains it from above downwards. One may add, that the Stroke works its Effect with more Ease if the Jaw be gaping ; I have never seen any others, and great Practitioners affirm the same : Nevertheless, it is not impossible, but it may happen from Blows ; but, I believe, the Mouth must at least be a little open at the Instant of the Stroke or the Fall.

The
Mouth
must be
open.

The Jaw
some-
times
hard to
be dislo-
cated.

The Jaw is dislocated with greater Difficulty than many other Parts, not only on Account of what I have just said, but because there are two Articulations ; that these two are distant from each other, that they both make Resistance at the same Time, and that the Mus-
cles

cles are very strong, and the more so, because they are very short, insomuch that they resist, and retain it more strongly in its Place.

Notwithstanding, one sees some in whom the Observation. Articulation of the Jaw is so loose, that it often dislocates in gaping. I have set it twice on the same Day, and for the same Person,

Prognostick.

Hypocrates says, that if the Jaw is not speedily set, a high Fever, Heaviness, Inflammations, Convulsions, and Vomitings of bilious Matter will follow, and even Death it self on the 10th Day. 'Tis what I have never met with, but yet 'tis not impossible that it may happen so in violent Luxations, by Reason of the great pulling and Extension of the Nerve, which fills the Canal of the Jaw, and which is one of the great Branches of the fifth Pair, whose Origin is very near. Thus this Luxation is not fatal if speedily reduced.

Prognostick.
Aphorism of Hypocrates.
The Possibility.

The Reason.

Cure.

To make the Reduction, the Patient must be set upon a Chair, as high as the Breast of the Chirurgeon's Servant, who supports the hind-part of his Head against his Breast upon a little Pillow: He must hold his Head with both his Hands, which must be mutually join'd by the locking of his Fingers, and strongly clasp'd upon the Patient's Fore-head: Thus he draws, clasps, and with-holds the Head, which performs the Office of Counter-Extension: Then the Chirurgeon having wrapp'd some Linnen about his Thumbs, that he may not hurt them against the Teeth, introduces them into the Mouth,

The Cure.
The Operation.

Mouth, the one on the Right, the other on the Left; he rests them upon the last Grinders, as near as possible to the Articulation of the Jaw, thrusting them downwards and backwards; downwards to stretch the Muscles, and afterwards to place the *Condyles*: This done, he raises the fore-part of the Jaw, and at the same Time he throws his Thumbs into the Cheeks as quick as possible, to avoid being bit, which would happen by the Contraction of the Muscles, which then shut the Jaw in an Instant.

An ill
Method.

There are some Chirurgeons who are for performing the Reduction by strong Blows with their Fist under the Chin, others make use of a Stick, as of a Leaver to open the Jaw. They do this, by resting it upon the Fore-part of the upper Jaw, whilst they are using their Endeavours upon the last Grinders of the under one. I reject both these Methods, which may break the *Incisores*, cause a great deal of Pain, and even hurt the Bottom of the Throat, if the End of the Leaver should slip, which is very possible.

For what
Reason.

Another
bad Me-
thod.

The di-
ficulty of
succeed-
ing.

There are some who put a Sort of Gag under the Teeth, and then strike the Chin underneath like the first; but these Ways are entirely wrong, and one cannot use them with Success, unless the Gag be placed under the last *Molares*, without touching the other Teeth: In this Case, by bearing upon the Chin, and striking under it, as if to bring the under Jaw near the upper one, whilst the Gag remains at the Point before-mentioned, perhaps it might be reduced; because the Blows of the Fist, or the Force of the Hands, and the Resistance of the Gag, extend the Muscles, which may thrust back

back the *Condyles* into their Sockets. But as it is impossible to confine a Gag only to the last Grinders, I think this Way very difficult in practice, tho' not so dangerous as the precedent ones.

If those who make Use of a Gag rest it upon the other Teeth, they will never succeed, because the Force that Operates, however considerable it may be, is of no Effect when it is near the *Fulcrum*, they would sooner break the Teeth and the Jaw it self, than reduce it. I have nevertheless seen some reduced by only one blow of the Fist without a Gag; but the Luxation was incomplete, and the *Condyles* were not so far removed, but that the *Muscles* were still distant enough from their *Fulcrum* to allow of that Reduction; whereas 'tis impossible to make the Reduction by the means before mention'd, when the *Muscles* pass by their *Fulcrum*, that is when the *Condyles* are in a right Line from the Origin of the *Muscles* to their insertion. 'Tis in this State that the *Masseter* and the *Pterigoides Internus* are; the *Crotaphitis* seems more favourably inserted, it is so stretch'd that it can't act.

Incident

A possible Case.

The State of the Muscles.

When the Luxation is but on one side, the Extension and other Operations are only made on that side. This Luxation is more difficult to reduce than that which is complete of both *Condyles*, for two Reasons. The first is, That the *Muscles* have retain'd more Force, and consequently make more resistance. The second is, That the Jaw is less open, which hinders the introducing the Thumb so near the Articulation as is necessary to get the better of the Resistance of the *Muscles*, whereas 'tis quite contrary in a Luxation in both sides.

Cure of the Luxation on one side

The Incomplete more difficult than the Complete

All the Dressing consists of a simple Defensive, a Compress with four Ends crosswise fastned to the

the Cap. A Regimen and the general Remedies are of no great Use, unless there be a Complication.

I can't help saying *en passant*, that this Disease, which seems to be distinguishable and known at first sight, was nevertheless mistaken, one Day, for an Accident proceeding from an Apoplexy in the *Gouvernante* of the famous Mr. *De Pile*, Author of the History of Painters; but having examined her I cou'd find no other Symptom but a difficulty of speaking, caused not by an Apoplexy, but by a Luxation of one of the sides of the Jaw, I made the Reduction, and the Patient instantly spoke with as much ease as before.

C H A P. IV.

Of the LUXATION of the Vertebrae.

THE Articulation of the *Vertebra* is not very easy to be describ'd; nevertheless it is impossible to comprehend well the Manner of their dislocating, if one has not at least a general Idea of it.

Their Structure The *Vertebra* are join'd by their Bodies, and their oblique *Apophyses*. Their Bodies are flat at Top and Bottom, except the six last of the Neck, and the two or three first of the Back. The union is made by Cartilages and Ligaments.

Cartilages.

The Cartilages have not the Consistence of those which join the other Parts; they are much softer, more flexible and capable of yielding to the different Motions of the Body: they become small on that side that we stoop, and thick, equally

ly thick, on the opposite quarter. When the Body is strait, and the *Vertebrae* rest perpendicularly upon each other, they are equally small every where. If we stand strait with a Burthen upon our Heads, these Cartilages don't take up the whole extent of the Surface whereby the Bodies of the *Vertebrae* are joined to them. They leave about a line and a half in the Circumference, which not being fill'd by the Cartilage, serves for a Place of Adhesion to the Ligaments.

'Tis to be remark'd that the Place in the Body of the *Vertebrae* where the Cartilage is fasten'd, is more hollow and more porous than that where the Ligaments are fix'd; and this Side which is but one Line broad in the *Vertebrae* of the Neck, one, and one and a half in those of the Back, and two in those of the Loins, is an *Epiphysis* more raised, and less porous than that which serves for the Adhesion of the Cartilage. This Cartilage which is seven Lines thick at the *Vertebrae* of the Loins, is less at those of the Neck and Back.

The Ligaments of the *Vertebrae* are very numerous, the most considerable are, first those of which we have just been speaking, and which I'm going to describe.

These Ligaments (as has been said) are fasten'd from the Body of one *Vertebrae* to another, and take up by their fastenings all the Side of the *Epiphysis* before mention'd. Their Fibres have different Directions, there are those which are oblique in a different sense, which cross each other on the outside in the form of the Letter X. There are Circular Ones, which seem to be of no other Use but to bind and support the others; 'tis even remarkable that in their oblique Plans there are others which are perpendicular. These Ligaments don't appear to be terminated at the Side of the flat Surface, they seem to pass over the

Remarks.

Ligaments.

Their Adhesion.

the round Part of the Body of the under *Vertebra*, infomuch that these exterior Ligamentous Fibres are look'd upon as one single Ligament, which would fasten all the *Vertebra* by the exterior Part of their Bodies, from the Head of the *Os Sacrum* to the second *Vertebra* of the Neck.

The hinder Ligament. Another very considerable Ligament is that which is found in the hind Part of the Body of the *Vertebra*, at the place where they form the anterior Part of the Canal of the *Spinal Marrow*; and which reaches the whole length of it.

Another Articulation. The Second Articulation of the *Vertebra* is, that which is made by the oblique *Apophyses*. It is look'd upon by the Ancients as a *Ginglymus*, or Hinge, because each *Vertebra* has four oblique *Apophyses*, the upper ones receive the oblique *Apophyses*; of the Upper *Vertebra*, and the under ones are received in the two oblique *Apophyses* of the under *Vertebra*.

What Name ought to be given to the Articulation. These Articulations ought rather to be regarded as double *Genu*, not that they have all the Motions of a real *Genu*, but because their Motions are not confin'd to only the Bending and Extension of the Spines; and the Back-bone cannot move round, without these little *Genus* being moved also.

Oblique Apophyses. These Oblique *Apophyses* are again cover'd on the Outside of their Articulation by a Ligament, or Ligamentous Tunicle that retains the *Sinovia*; and they are restrain'd, as well as the Body, by several very strong Ligaments.

Their Ligament. There are some which fasten the *Apophyses Transversales* to each other, others restrain them by their Spiny *Apophyses*, and besides there are others in the inner Part of the Canal of the *Spinal Marrow*, viz. One improper that goes from the Root of one spiny *Apophyses*, to the Root of the other; and one that is common to all the *Vertebra* which proceeds inwardly from the Head of the

the *Os Sacrum* to the Root of its first Spiny *Apophysis*, and which passing over all the proper Ligaments, adheres strongly to the inner Part of the Root of the Spiny *Apophysis*, the whole length of the Canal.

The Muscles of the Spine are not less difficult to describe, then the Articulation of the *Vertebra*; but as the Description of them is not so useful for the Understanding Luxations of the *Vertebra*, I shall content my self with saying that almost all the Muscles are situated at the hind and lateral Parts, and that there is not one before, except at the Neck, where is the long *Flexor*; and part of the *Scalenus*. 'Tis also known that there are Muscles which are common to a great Number of *Vertebra*, and that there are many which are proper to each.

The Spinal Muscles.

All these Muscles move the *Spine* very sensibly at the last *Vertebra* of the Back: All those of the Loins have a considerable Motion, and even those of the Neck; but the *Vertebra* of the Back move much less, because they are restrain'd by the Ribs, because the Cartilages of their Bodies are small; and their Spiny *Apophyses* are very long, and lie upon each other.

The Motions of the Spine

'Tis known that the Spine forms a Canal which contains the Marrow; that the Parts of this Canal must be made so as to be moved without incommoding this Marrow, or the Nerves which issue from behind, and from the Sides of it across the Holes which the *Vertebra* form by their Conjunction.

The Spine moves without hurting the Marrow,

From this Structure, one may infer several Things; so that the *Vertebra* must be difficult to luxate, because the Strokes, Falls, or Strains, must get the better of the prodigious Number of Muscles and Ligaments; and that they seem to be secured from it by this Junction of the Bo-

Its Luxation difficult.

dy of the *Vertebra*, so well cemented by Ligaments and Cartilages, that it seems as if Nature, in forming this Union of so many Bones, had intended to reconcile Firmness with Motion.

2. There are several Difficulties to surmount in the Reduction, but besides those which we might cite with regard to the Structure of the Part, there is one which seems to me not the least, that is, that the means hitherto employ'd for the Remedy of the Disease, are so contrary to it, that they can never succeed, which shall be demonstrated.

3. The Marrow of the Spine, the Nerves which issue from thence, and consequently the Organs where these Nerves distribute themselves, ought to be the Seat of the Symptoms that attend this Distemper; because the Canal of the *Spine* is with respect to the Marrow which it contains, what the *Cranium* is to the Brain. What Accidents ought one not to expect if any *Vertebra* should be out of its Place, and what will not the Nerves suffer which pass by the Holes that form their Cavities? If the Marrow is compress'd, the inferiour Parts will fall into the Palsy, and Gangrene, and if there are but certain Nerves compress'd, the Patient will suffer intollerable Pains at the place of Compression, and will have the Palsy in the Parts where the Nerves, so compress'd, distribute themselves.

4. The Manner of reducing dislocated *Vertebra* ought not to be the same with that describ'd by the Ancients, and still practised by the Moderns, to the great Injury of those who are in that melancholly Condition.

'Tis 18 Years since I publish'd a new Method, founded upon the natural Structure of the Parts; the Desection of Bodies, upon Success; and I may venture to say, upon the bad issue of the ancient

cient Method ; no Body has followed it, so difficult it is to shake off the Yoke of Prepossession.

Of their Sorts and Differences.

'Tis difficult, not to say impossible, that a compleat Luxation shou'd happen to the *Vertebra*, with out the Patient's dying upon the Spot, or a little afterwards ; and accordingly it is found, that their Luxations are generally incompleat.

A compleat Luxation difficult.

We call that a compleat Luxation, when the dislocated Bone no longer touches that to which it was joined at the Places which made the Junction ; and in the usual and incompleat Luxations of the *Vertebra*, greatest Part of their Bodies always touch, insomuch that they are never dislocated entirely, but at their oblique *Apophyses* : One even sees every Day, that the two oblique *Apophyses* are not always equally dislocated, one may be forc'd from its Place, whilst the other remains almost in its natural Position.

An incompleat Luxation common.

Luxation of one *Apophysis*.

There are Luxations of one, two, or three *Vertebra*, which must be understood in this Manner: for Instance, if the first *Vertebra* of the Loins is dislocated from the last of the Back, and the last of the Loins from the first of the *Os Sacrum*, one ought not to say, that the five *Vertebra* of the Loins are luxated ; this however is the common way of speaking, but without Reason, because the three *Vertebra* that are between the first and the fifth are not dislocated.

Luxation of 1, 2, or 3 *Vertebra*.

Example.

It must also be remark'd that a *Vertebra* may be put out either at the Top, or at the Bottom, or both together, which happen very seldom.

Remark.

The *Vertebra* can never be dislocated by a Strain on the Side of the Extension of the *Spine*, unless the Cartilage and Ligaments, which join the Body

On what Side the *Vertebra* luxate.

dy of the *Vertebra*, be broken, and in that Case the Patient would soon die by the Compression, the extraordinary dragging, and even the Rupture of the *Spinal Marrow*.

On what Side the Apophyses dislocate. The oblique *Apophyses* cannot be luxated after this manner, because the Extension of the Spine rather draws them nearer than removes them; thus all Luxations of the *Vertebra* at their oblique *Apophyses*, happen only by a Strain on the outside of the Flexion, whether the Strain is directly before, a little to the Right, or a little to the Left, as shall be explain'd immediately.

First Example. If one strains violently in bending the Spine directly forwards, the inferiour oblique *Apophyses* of one *Vertebra*, will be forced from the Bounds prescrib'd to them by the superiour oblique *Apophyses* of the under *Vertebra*, and then there is a Luxation of the two oblique *Apophyses* of the upper *Vertebra*.

Second Example. If the Strain happens, on the right Side in bowing the Spine, the left oblique *Apophyses* breaks out from the oblique *Apophysis* which receives it.

Third Example. If the Strain happens in the bending the Spine on the left Side, there will be a Luxation on the right Side.

Of the Diagnostick Signs.

Signs common and proper. They are common and proper. The common Signs are the deform'd Shape of the whole Body, the difficulty, and sometimes, impossibility of walking, the Numbness of the Parts that are beneath the Dislocation; from whence there follows instantly, or sometime afterwards, a Palsy in the lower Extremities, the Belly becomes bound, the Urine is stop'd the first Days, and afterwards runs involuntarily: Then comes a Mortification, and Death is not far distant.

Melancholly Accidents.

The

The Shape of the Body is deform'd, because the *Spine* no longer retains its usual uprightness. 1st Explanati-

It's difficult, and sometimes impossible, for the Patient to walk, both because the *Spine* being no longer strait, the Weight of the Body is not upon the Line of Gravity; and, because if the Patient tries to replace it there (as hunch back'd People do) in order to walk, all the Motions he makes, are so many Shocks, which shake and press the Spinal Marrow, and cause violent Pains, which he will willingly avoid by ceasing this troublesome Experiment, 2d Explanation.

What also causes a Difficulty of walking, is, that the Compression of the Marrow interrupts the Course of the animal Spirits in the Muscles of Progression, which are sometimes not only weakened, but entirely lose their Elasticity in 24 Hours, and even sooner, according to the Degree of Compression which the Marrow and the Nerves suffer. Another Reason.

The Consequences of this Compression, are, Numbness, Costiveness of the Belly, the Palsy, stoppage of Urine. Involuntary Ejections, and the Gangrene, are the Effects of a Total Compression of the Marrow and Nerves. Third Explanation.

It must be observed nevertheless that the Gangrene comes, first, at the Spiny *Apophyses*, at the *Spines* of the *Ossa Ischij*, the Flesh of the great *Trochanter*, the *Coccix*, and the End of the Buttocks; because the Patient lying always upon his Back, these Parts are compress'd, by the Weight of the Body, between the Bones and the Bed, whence the Blood Vessels are depressed there, and the Humours stopt, so much the more, because the Parts that are Paralitick; and have lost their Elastick Force, suffer themselves to sink down, and can't withstand the Compression. Observation on the Gangrene
Reason of these things

1. Proper Sign. The proper Signs are four, the first shows us whether one or more *Vertebrae* are luxated.

2. Proper Sign. The 2d whether the Luxation is of two oblique *Apophyses*.

3. Proper Sign. The 3d. If it is at the Right oblique *Apophyses*.

4. Proper Sign. And the 4th, that the Dislocation is at the Left oblique Process.

Sign of several *Vertebrae* being luxated. When the Luxation is of 2 or 3 *Vertebrae*, the Crookedness of the Spine is greater than when there is but one displaced.

Sign that the Luxation is of two *Apophyses*. In a Luxation where the two oblique Processes are disjointed, the *Spine* is bent forwards in a right Line, the Patient feels considerable Pain if 'tis bent any more, and on the contrary, he finds Ease, if one straitens it a little; which is caused by reason that in the Flexion, the Ligaments and the *Musculi Extensores*, which are already violently extended, are stretched too much, and when the *Spine* is raised a little, the Patient finds himself eas'd, because the Extension of the Muscles and Ligaments is diminish'd.

An essential Remark. I must make one essential Remark. The Muscles have no share in causing the Deformity of the dislocated Part, as they have in other Luxations; this Distortion proceeds wholly from the displacing of the oblique *Apophyses*, and the *Spine* always throws it self on the Side that is bent, tho' the Muscles don't draw it thither; for notwithstanding the Body is bent, it is drawn backwards by the Contraction of a prodigious Number of the Muscles, wherewith the whole Back of the *Spine* is covered.

Reflection. If the Muscles were in any ways the Cause of this Distortion, the *Spine* wou'd be overturn'd and drawn backwards, and 'tis seen on the contrary, that it keeps bent, even after all the Muscles are

are cut, which I have try'd on several Bodies of Persons who have dy'd of this Disease.

The Signs that the oblique Process of the right Side is dislocated, are, partly those we have just mention'd ; to which must be added, that the *Spine* bends to the left, that the Patient feels excessive Pain if one bows the Body on the Side to which it leans, and that he finds Ease if 'tis thrust towards the Side from whence 'tis luxated.

Signs of a Luxation on the Right Side.

When the oblique Process of the left Side is dislocated, the Body bends to the Right, the Patient is in Pain when one bows the Body on the Side to which it bends ; and finds Relief if 'tis thrust the opposite Way.

Signs of a Luxation on the left Side.

I shall not give any Signs by which to find out the Luxations which are said to happen directly backwards, directly to the Right or on the Left, I believe I have proved sufficiently that they are impossible. I leave the Care of describing their Signs to such as think they have met with them.

There are no other Luxations

Prognostick.

The *Vertebrae* of the Loins are more easily dislocated than those of the Neck, and these again more easily than those of the Back.

A Remark of Use in Prognosticks.

The *Vertebrae* of the Loins dislocate with less Difficulty than the others. 1. Because they are situated in the middle of the Body, or at least at the Part where the Flexion is the strongest, and where Strains have most Power, as is seen by a Stick, which being pressed at both Ends, is considerably more bent in the middle than at its Extremities.

First Reason.

2. Their oblique *Apophyses* are more outward than those of the Neck and Back, and consequently are more exposed.

Second Reason.

Third
Reason.

30. The *Vertebræ* of the Neck have a Cavity, in the upper Part of their Bodies, which receives the Eminence of the *Vertebræ* above them, which gives them a stronger jointing than those of the Loins, whose Bodies are flat.

Fourth
Reason.

4. The Cartilage at the *Vertebræ* of the Loins being thicker, they move with the greater Facility, and 'tis known that Luxations happen most frequently, and most easily, at those Articulations that have the most Motion.

Fifth
Reason.

Lastly the *Vertebræ* of the Back are luxated with most Difficulty, because the Flexion of the *Spine* is not great there, and they are most strongly jointed with the Ribs.

Cause of
Danger.

All Luxations of the *Vertebræ* are dangerous, which proceeds from two things.

1. Cause.

First, From the Compression, Commotion, and dragging of the Marrow of the *Spine*, which being only the Extension or lengthening out of the Brain, must suffer infinitely; and 'tis well known of what Importance that is for the most useful Functions of Life.

2. Cause.

The Second is from the great Difficulty of reducing the Luxation, especially if one follows the Practice of the Antients.

The most
dange-
rous Lux-
ations
and why

Luxations of the *Vertebræ* of the Neck and Back, are more dangerous than those of the Loins, because there require a greater Strain to disjoint them, and that when they are dislocated, they compress a greater Extent of Marrow; whereas 'tis contrary in the Luxation of the *Vertebræ* of the Loins,

Thus in the Luxation of those of the Neck, there are more Parts Paralitick, because the Nerves which issue from the Marrow, at the Neck and Back, have Communication in more Places with the eighth Pair, and the *Intercostal*,
before

before it has supply'd its Branches that are of the most Importance to the Natural Oeconomy.

The Luxation of two or three *Vertebrae* is more troublesome than the Dislocation of one only, because the Marrow is compress'd in more Places, or in a greater Extent.

Luxation of 2 or 3 most troublesome.

The Luxation of two oblique Processes, is less difficult to reduce than the Dislocation of one only.

Luxation of 2 oblique Processes.

If the Luxation of the *Vertebrae* is not reduc'd, the Patient must infallibly die.

If not reduc'd the Patient dies.

The Patient will die tho' it be reduc'd, when it has been deferr'd too long, because Defluxions have followed the Dislocation; or, because the Marrow and the Nerves, which are soft and tender Parts, have been too long compress'd to be able to resume their *Tonus*; thus the Obstruction does not cease, and the Palsy continues with all the Symptoms.

If 'tis deferr'd too long.

Altho' the incompleat Luxation be the most difficult to reduce, yet it is less dangerous than the compleat one, because the Marrow is less compress'd in the one than the other.

The Incompleat Luxation least dangerous.

I once knew a Soldier who did not die of a Luxation of a *Vertebra*, altho' it was not reduc'd, because this Luxation was occasion'd by a Strain, which gives me Reason to believe that the Dislocation of the *Vertebrae* is yet more dangerous by the Commotion which a violent Fall causes in the Marrow, than by the displacing of the Bones.

Observation.

The Parts may by little and little accustom themselves to the Compression that is occasioned by the Bones being displac'd, but cannot bear up against the Compression, tho' but slight, when they have been jarr'd by a violent Shock.

Reflection.

From the same Reason there are Fractures and Depressions of the *Cranium*, which are cured without

without trepanning, but these uncommon Cases don't make a Rule.

Of the Cure.

Cure of
disloca-
ted Verte-
brae.
How to
place the
Patient.

A new
Method.

To reduce the dislocated *Vertebra*, the Patient must be laid upon his Belly, a cross a Bed three Foot broad, with a large Sheet upon it, rolled up in the shape of a Bolster; this Sheet must be plac'd according to the length of the Bed, and upon it the Belly of the Patient just opposite to the dislocated *Vertebra*; two Assistants must lean, one upon the upper Part of the *Spine*, near the Root of the Neck, and the other upon the *Os Sacrum*, in order to bend the *Spine*; then one must press upon the luxated *Vertebra*, that is to say, upon that which is immediately below the most eminent Part of the Tumour that is visible; at the same Instant they must raise that Part of the Trunk that is towards the Head, and the *Vertebra* is reduced.

Essential
Remarks.

One may make the following Remarks upon this new Method.

We have already said, that the Muscles do not change the Figure of the Part, in the Luxation of the *Spine*, altho' they do their Endeavours to extend it; it is the oblique *Apophyses* which, by meeting with the Ends of each other, hinder the *Spine's* streightening, which makes the Attempt of the Muscles fruitless, and this is what has not been observed by those who have written of this Distemper, nor put in Practice by those who every Day attempt these Sorts of Reductions.

Errors of
Authors.

'Tis not wonderful to see Authors propose Extensions, Counter Extensions, laying under of Rollers, Leavers, and Presses, in order to reduce luxated *Vertebrae*; it is not, I say, wonder-
ful

ful, because most part of those who have written were only Chirurgeons in Theory ; Persons must practise ; that is the Means to learn Surgery, provided they reflect upon what they do, and know how to profit both by their Success and Misfortunes. There are some who their whole Lives do nothing but copy their own Faults.

I say, that the *Spine* must be bent, which is contrary to the usual Manner of reducing other Luxations, wherein one turns the Limbs on the Side of the Muscles that are stretch'd, in order to relax them. The same must not be done in reducing the *Vertebra*, for, in bending the Body, far from relaxing the Muscles, one extends them ; 'tis by this Means that the oblique Processes of dislocated *Vertebra* are removed at a Distance from each other, and that they easily resume their Places. In following the Method which I have proposed, it always succeeds when 'tis well put in Execution.

There are some who never mend.

They, who in order to reduce the *Vertebra*, make Extension, and Counter Extension, with Straps, or other Means, can never succeed, because all their Endeavours end in straitening the Spine, and that must not be done 'till the oblique *Apophyses* are disengaged, and no longer touch each other, their touching being the only Cause that hinders its becoming strait.

A faulty Method.

They who, hang up the Patient under the Arms; and they who put Sticks and Rollers on the Side of the *Spiny* Processes, and press upon them with a Leaver, do at least as wrong as the others ; their Endeavours tend only to press the oblique Processes against one another ; but on the contrary, one must disengage them to make them return to their natural Position.

Another wrong Method.

The other two sorts of Luxations of the *Spine*, require almost the same Operation ; nevertheless

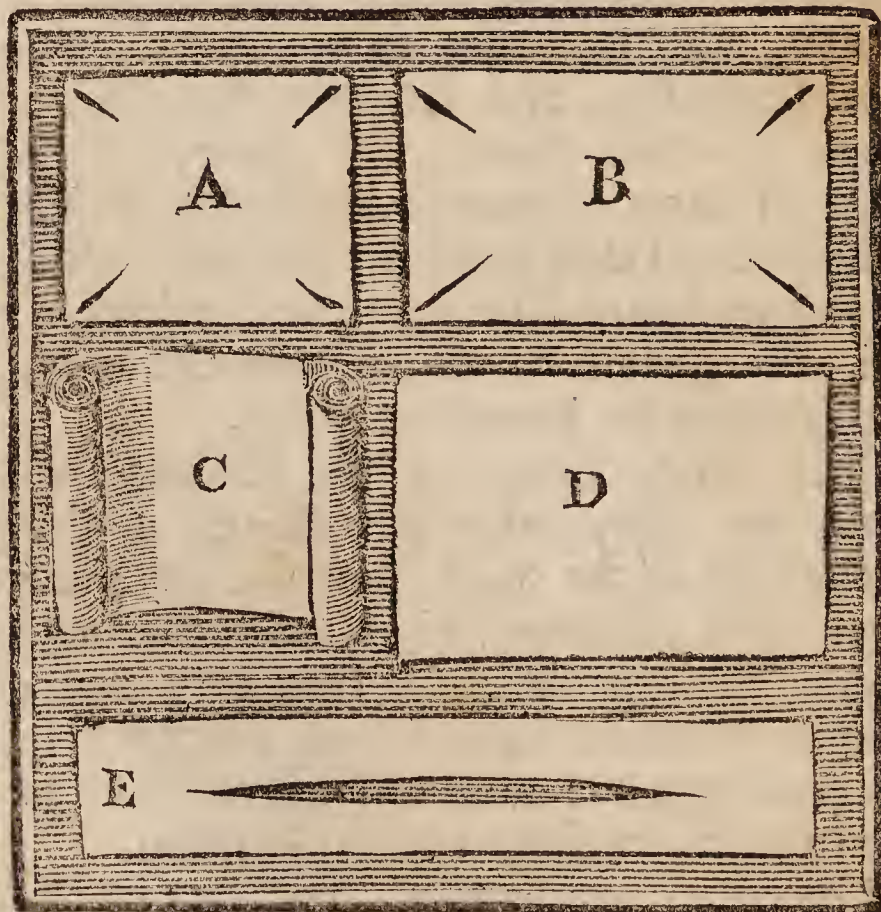
Reduction of the two other

kinds of
Luxation.

less it must be observed, that if the Luxation is at the oblique *Apophyses* on the Left Side, one must bear upon the Bone of the Left Hip, and upon the Right Shoulder; that if 'tis the right oblique *Apophyses* which is dislocated, one must bear upon the Bone of the right Hip, and upon the left Shoulder, in order to make an unequal Flexion that agrees with the Inequality of the Disjointing.

The
Dressings.

When the Luxation is reduc'd, the Compresses (A) and (B) must be laid all over the Spine, being kept on by the Bandage for the Body (D), the whole supported by the Scapulary (E) and upon the Belly they put the Belly-Band (C). The Patient must be laid upon his Back in a smooth Bed, be blooded several Times, and observe an exact Regimen.



The Places that are benumbed or paralytick, should have spirituous Fomentations apply'd to them, and be chafed with hot Linnen. When the Body is sufficiently emptied, and the Pain is not considerable, vulnerary Potions may be given; on the contrary one must only give Anodyne and even Narcoticks if the Pain is acute. If the Patient is costive, he must take Clysters, and if he does not make Water, he must be probed.

Topical
Medi-
cines.

Potions.

Clysters.
Probing.

As for the Dressings the taking them off, must be deferred as long, and be done as seldom as possible, especially if the Patient is quiet, and the Pains are not sharp. One must observe what passes, to the End that one may find Remedies for any melancholly Accidents that may ensue; if the Pulse beats high, one may bleed afresh in the Arm, and if that does not succeed, in the Throat, since for any Disorder in the Head 'tis usual to bleed in the Foot, which also may be practiced in Luxations of the *Vertebrae*, provided one observe two Things; first, That the Vessels are well empty'd by the Bleeding in the Arm, and 2dly, that the Patient may be let Blood in the Foot without moving him.

If a Fe-
ver fol-
lows.Observa-
tions.

If the Belly remains bound in Spite of the Clysters, one may make them Cathartick; and if that don't succeed, one must purge, provided there is Blood enough taken from the Patient, and the Dose is not violent.

Observa-
tion.

If the Belly becomes stretched and painful, Fomentations, emollient Embrocations and Anodynes, are very useful, together with the general Remedies.

Tension
of the
Belly.

If there be a *Gangrene*, one must deal with it apart, according to the different Degrees of Alteration. When the Alteration is slight, one makes Use of spirituous and saline Lotions, as

Spirit

Spirit of Wine camphorated, and a Solution of *Sal Armoniack*, all laid on very hot, and often reiterated.

Stirax
useful.

If some Places are of a red-like Purple, Ointment of *Stirax* may be added, after having wash'd the Part with the abovementioned Lotion.

Scarify-
ing.

If the Spots are livid, one must scarify to the quick, foment with the before-mentioned Lotion, and apply Pledgets covered with a Digestive, made of *Basilicon*, and Ointment of *Storax*. One must cover the Part with a Cloath spread thick with *Storax*, and clap upon it thick Compresses, steeped in the Lotion very hot. The whole must be kept on with a proper Bandage.

Separati-
ons of the
Escars.

If the Escars separate, one may help their Separation, by cutting the dead Flesh, and avoiding the Quick, for fear of causing Pain, and then the Medicines penetrate better.

Incisions
and Cut-
ting.

If in Spite of the Applications of these Medicines, the *Gangrene* gains Ground, one must come to Incisions, and even to cutting after a proper Manner, taking as much Care as is possible of the Parts necessary.

When the Luxation is well reduced, the gangrenous Disposition ought to cease on the Application of the first topical Remedies that I have prescribed, provided the Marrow or the Nerves have received no Contusion or Bruise, considerable enough to render the Topicks fruitless.

Observa-
tions.

If the *Gangrene* were more advanced, as happens when the Reduction has been made too late, a Cure may yet be hoped for; but when it comes after the Reduction is made, 'tis a forerunner of Death; whence one may judge that the displacing of the *Vertebrae* has produced such Disorders in the Marrow and Nerves, as are incurable.

The

The *Gangrene* is yet more fatal, when after the Suppression there follows an involuntary Ejection of the Urine, and Excrements. This stagnated Matter heats and corrodes the gangrened Parts, and hinders the Operation of the Remedies.

It remains, to end this Subject, that I exhort the Chirurgeons, who have such melancholy Cases under their Cure, to have Abundance of Temper, to keep their Patients in as proper a Position as they can, to visit them often, in Order to prevent all their Wants, and hear their Complaints: For I dare venture to say, there are none greater Objects of Pity.

Exhortations.

Besides, they must always have their Bed provided with an *Alaise*, or Half-Sheet, and an Oyl Cloath; both the one and the other keep the Bed dry, and the Skirt in particular serves to turn the Patient, and place him upon the Belly, for the more convenient dressing of him.

What must be remembered

If the Palsy don't cease, tho' the Patient be cured of his Luxation, the Waters of *Bourbon* are very efficacious: Pumping is prescribed upon the Parts that have suffered, and they are to be taken inwardly, observing the same Precautions, as those who drink them after a Fit of an Apoplexy.

Observation.

C H A P. V.

Of the LUXATION of the Coccyx.

THE *Coccyx* is the Extremity of the Spine, placed where the Tail is in four footed Animals, and has three or four *Vertebra*. The first is jointed at its Body by, a Cartilage, with the

Structure

the

the End of the *Os Sacrum*: It has also two Sorts of oblique Proceſſes, which join it to the *Os Sacrum* by a Ligament. One may likewise obſerve in it two *Apophyſes tranſverſales*; the two other *Vertebrae* of the *Coccyx* have no Manner of Reſemblance to the *Vertebrae* of other Parts; they are jointed mutually between themſelves, and with the firſt by a Cartilage. Theſe Pieces together make a kind of Raven's Bill, convex without, and hollow and crooked within, in Order to ſuſtain the *Rectum*. It gives Adheſion to the *Sphincter Ani*, and ſome Part of the *Glutai*.

The
Word
Luxation
improper

What is commonly called the Luxation of the *Coccyx*, is not ſo, becauſe it's Junction is not an Articulation by Heads and Cavities, but an Union by Cartilage, which the Antients named *Synchondroſis*. However it be, 'tis very ſeldom that theſe *Vertebrae* are entirely diſjointed; which makes me believe that one ought to call their Luxation outwards, Overturning; and the Luxation inwards, Depression. If the *Coccyx* were entirely ſeparated from the *Os Sacrum*, it would be ſaid the *Coccyx* is broken, and not diſlocated. But leaving the Names, let us come to the Things, and ſpeak like the Vulgar.

Remark.

The
Kinds.

Cauſe.

The *Coccyx* diſlocates inwards and outwards. The outward Luxation happens only after hard Labours, when the Infant has ſtuck long in the Birth; on this Occaſion the Cartilages and Ligaments that join the *Coccyx* loſe their Elastiſcity, becauſe they are too long forced, and ſtretched by the Impulſion of the Infant, which is it ſelf continually thruſt by the Spring of the *Matrix*, the ſtrong Contraction of the *Diaphragm*, and the Muſcles of the *Abdomen*, whence the *Coccyx* at length not being able to reſiſt any more, is forced outwards; and can't return to its natural Poſition

sition after the Delivery, because the Cartilages and Ligaments have lost their elastick Virtue.

The *Coccyx* luxates inwards from contrary Kind and Causes, as Blows, Falls, &c. Cause.

The Accidents which attend this Luxation are, a Heaviness in the Fundament, and a considerable Pain, which is particularly felt when the Patient goes to Urine, moves his Thighs, goes to Stool, or coughs, spits, blows his Nose, or sneezes. Accidents of these Luxations.

The Heaviness proceeds from this, because the *Coccyx*, whose Use is to sustain the *Rectum*, finds its Weight greater than ordinary, by Reason its Ligaments are painful. Explication.

The Pain which the Patient feels when he moves his Thighs, or goes to Stool, is caused by the *Gluteus Major* being fastened to the lateral Parts of the *Coccyx*, and the Muscles of the *Rectum* having Part of their Origin there likewise, whence it is always mov'd when the Muscles act, either by the Motion of the Thighs, the *Rectum*, or the Bladder. Explication.

The Pain remains a long Time, nevertheless this Luxation is not dangerous, unless it happen to some cacochymick Subject, and the bad Qualities of the Humours cause Disorders which the Luxation alone cannot produce. Prognostick.

I once knew a Gentlewoman of 20 Years old, who fell upon the Ice, and got a very great Contusion in her *Coccyx*: She neglected her Ail, Shamefacedness not suffering her to shew it till there was a Disposition to gangrene. I bled her immediately, and relieved her so opportunely with Topicks, a *Regimen* and general Remedies, that she got quit of it for a superficial Impo-
sthume, which I opened, and of which she was soon cured. Observation.

Observa-
tion.

Another happened not to be so fortunate, she had fallen upon a Corner Stone, which struck the *Coccyx* near its Junction with the *Os Sacrum*. The same Bashfulness which was prejudicial to the former, was much more so to this; her Pains indeed were not violent, but she felt an uneasy Weight in the *Rectum*, which became more considerable from Day to Day. She would not consent to be touched until her Excrements could no longer pass thro' the *Rectum*; having placed her upon the Bed-Side in the same Posture as one who is to take a Glister, I introduced my Fore-Finger dipt in Oyl as high as I could into the *Anus*. I touched with great Difficulty a Tumour of the Bigness of a middling Pippin; and with my Fore-Finger of the other Hand, which I placed without near the End of the *Os Sacrum*, and the Beginning of the *Coccyx*, I discovered a Fluctuation, which answered from one Finger to the other as I moved them alternatively, which made me believe there was an Imposthume: The Business was to open it (instead of preparing it, as some complaisant Folks proposed) having declared the Danger of deferring it. The Relations of the Patient were of my Mind, as she her self was also, the complaisant Gentry were so likewise, and all out of Complaisance..

I prepared Linnen Rags, a Compress and Bandage; then I put again my Fore-Finger into the *Anus* with the same Precaution, I even thrust it in farther. I touched the Tumour a little better, and forcing it outwards as much as was possible, to bring the *Pus* near the Place where I had felt it, with the Fore-Finger of the other Hand, I plunged the Point of an Incision Knife directly to the Seat of the purulent Matter, which issued out in great Abundance; and

and the interiour swelling disappeared. I put my Finger into the Wound, and I found the Point of the *Os Sacrum*, and the Head of the *Coccyx* entirely bare and stript of the *Periosteum*, as well as rotted by the *Pus*, which drowned us with its Quantity, and poisoned us with its Stench. The Head of the *Coccyx* being entirely by it self, was separated and parted so as to give way for, and facilitate the Dressings which continued a long Time, and had not good Success, the Patient died at the end of six Months, by the melting the Grease of the *Pelvis Renum*, by extraordinary Suppurations, which were attended with a slow Fever and a Looseness till her Death.

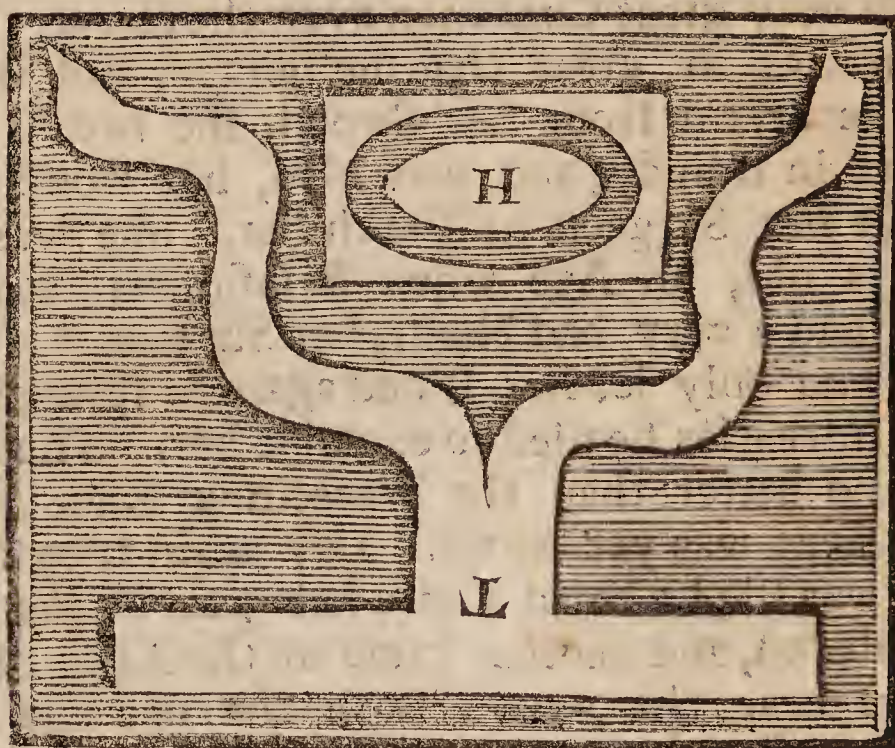
A Lady by sitting down hard upon the Frame of a Chair, instead of sitting on the Cushion, had a very great Contusion over the *Coccyx*. The Pain was so great that she fainted, and when she recover'd from her Swoon, she bath'd her Hurt in Brandy, and was bled, but wou'd not suffer her Surgeon to search her. She was 45 Years old, an Age when Bashfulness returns. She had a very bad Night, her Surgeon was called, and only let her Blood again in spite of all the Intreaties he used to examine her. The Day was no better than the preceeding Night, and the next was yet worse. Day again appearing, she was Bled a third Time, her pain in her *Coccyx* abated, and another came at the *Labia* of the *Vulva* near the *Anus*. Both the one and the other, swell'd in so short a Time, that in 24 Hours the Right Lip imposthumated; the Imposthume opened of it self, and Fear determin'd the Patient to suffer the proper Openings; which done, she was cured without any Inconvenience.

'Tis easily conceivable that if this Lady had suffered herself to be govern'd, more frequent Bleedings, and a Regular Management, might have prevented the Imposthume.

All Luxations of the *Coccyx* are not Subject to like Accidents; I have cured a great many where not one has happened.

Reduction.

To reduce the *Coccyx* when dislocated outwards, one need only thrust it inwards with ones Thumb, and keep it in its right position with the graduated Compresses (H) and a Bandage (T) which must be placed in such a manner that the Patient may go to Stool and Urine without taking off the Dressing.



Spirituos

Spirituous Medicines are very proper: Medicines. I likewise use on this Occasion a Defensive, the Method of preparing whereof I will lay down as it was taught me by the Inventor of it. 'Twas the late Mr. *Martial* who was Surgeon Major of *Tournay*, in the War concluded at *Reswick*.

Brandy wherein a little Allum has been dissolved, with Spirit of Wine camphorated, and a great many other Remedies, may be made use of, not only in this Luxation, but all others. I am no admirer of Oyl; I have observed so often that it causes Itching, and an *Erysipelas*, that I have left it off in all Dressings of Fractures and Luxations. Remedies

To reduce the *Coccyx* when luxated inwards, one must dip one's Forefinger in Oyl of Olives, or of Sweet Almonds, and introduce it into the *Anus* as far as is necessary to get beyond the end of the *Coccyx*, in order to raise it. The same Remedies are applyed; but one makes only a loose Bandage purely Contentive to keep them upon the *Coccyx*. Reducti-
on of the
Coccyx
inwards.

The Patient must keep his Bed lying upon a Roller or Pad, during the whole Cure; or if he rises, he must sit down upon a perforated Chair that nothing may press upon the Part; which would cause new pains, and perhaps a Dislocation.

CHAP. VI.

Of the Luxation of the Clavicula.

Use of the
Clavicle.

THE *Clavicula* is that Bone which, like a sort of a Buttress, keeps the *Omoplata*, and the *Humerus* at a distance from the Breast, both to hinder the Weight of these Parts from straitening the Breast in its Dilatation, and to give Liberty to the Arm to exercise all its Motions. This Bone is articulated with the *Sternum* and the *Acromion*.

Structure.

To join it self with the *Acromion*, it has a Head a little raised, covered with a smooth Cartilage, which is received in a Cavity proportionable to the largeness of the Head, which is hollowed in the internal Side of the End of the *Acromion*. It is as it were the little Head covered with a Cartilage smooth and polish'd: The whole is overcast, wrapt up, bound and fastened by strong and compact Ligaments, inso-much that by this Articulation the Clavicle has but little motion. The *Deltoides* and *Trapezius* are fasten'd to the *Clavicula* and the *Acromion* at the place of their Junction.

In its Articulation with the *Sternum* it forms a pretty large Head, covered with a smooth Cartilage. The *Sternum* has a Cavity whose Size is not answerable to the largeness of the Head. neither the one nor the other have a regular Roundness, nevertheless they are joined to a Median Cartilage that is found in the Articulation, like that which we have observ'd in the jointing of the under Jaw. The whole is fastened and covered over with Ligaments that are pretty strong, but loose, and give the *Clavicle* great

great Liberty in moving; and it does move, whenever the *Omplata* either moves alone, or with the *Humerus*.

The *Musculus Sternoclinomastoides* takes its beginning from the *Sternum* of the *Clavicle* at the place of this Junction. The *Pectoral* is fastened to the internal half, and the *Deltoides* to the external half, of the *Clavicle*, and the Vessels that go to the Arm pass behind it.

Both the Articulations of the *Clavicle* may dislocate. The most easy Luxation is that of the Articulation of the *Sternum*, because it is more moveable than the other, and that its Head is larger than the Cavity that receives it. Falls and Blows upon the Shoulder always thrust the *Clavicle* towards the Side of the *Sternum*, and 'tis this Articulation which suffers the most.

It dislocates either backwards or forwards. When 'tis thrust backwards, the *Clavicle* approaches the *Aspera Arteria*. When it is luxated forwards, it breaks out of its Socket, and goes beyond the *Sternum*. The Kinds.

The first happens but seldom; the second is more easy, because the *Clavicle* inclines to that Side by its natural Situation; since that end of it which is fastened to the *Omplata* is removed farther backwards, than that which is joined to the *Sternum*.

Of the Cause.

The Causes both of the one and t'other of these Luxations, are Blows and Falls, which are capable of thrusting the *Clavicle* against the *Sternum*, and oblige it to leave its Socket, and throw it self backwards, if the Shoulder be forwards; or forwards if the *Humerus* be in its natural Situation.

Of the Signs.

Signs.

It is easy to know these Luxations; the first because of the sinking in that is observed at the Place whence the *Clavicle* is come; and the Second, by the prominence that is seen outwards.

Prognostick.

Prognostick.

The Accidents in a compleat Luxation backwards are very melancholly, because the *Clavicle* Compresses the *Aspera Arteria*, the *Oesophagus*, the Jugular Vein, the *Carotides*, and the Vessels adjacent; which renders this Luxation more difficult than the other.

Of the Cure.

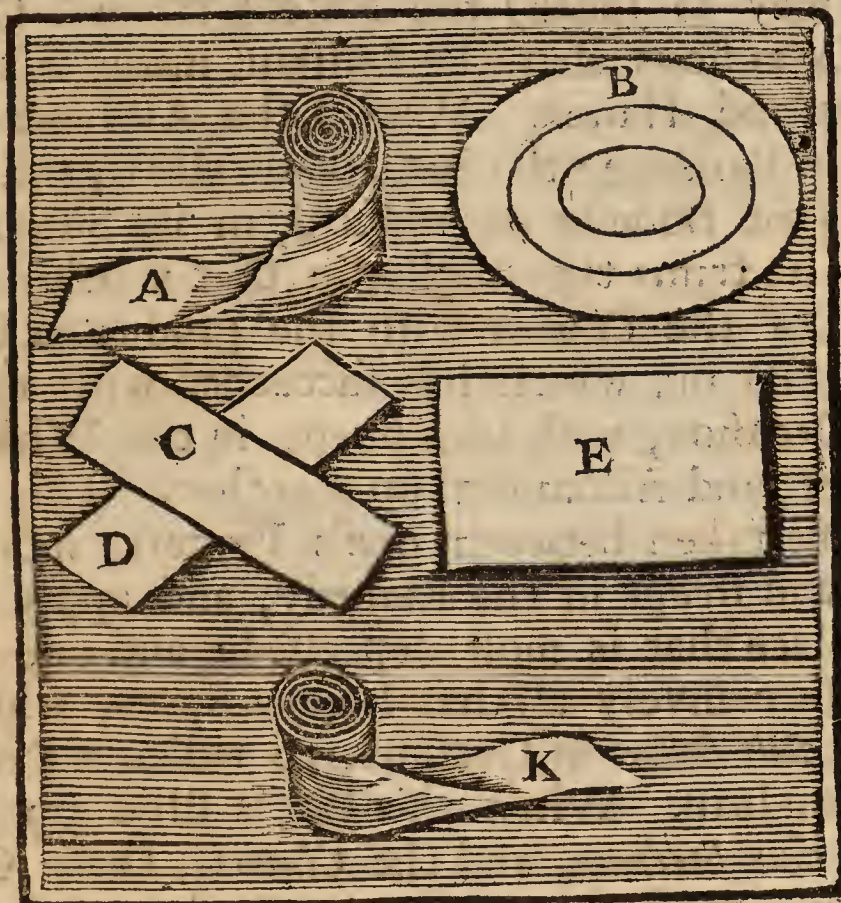
Reduction.

'Tis easier to reduce the *Clavicle*, than to keep it in. To reduce it, the Patient must be plac'd upon a Stool, one single Assistant makes the Extension and Counter Extension, by leaning one of his Knees on the two *Omoplate*, and at the same time drawing to him the Stump of the *Humerus* with both his Hands. Whilst the Extension is making, the Surgeon examines the Progress, and when he thinks it sufficient he makes the Reduction (his Assistant still continuing to do his Part) by drawing the *Clavicle* forwards with his Fingers, when the Luxation is backwards, and thrusting it backwards when the Dislocation is before.

Remarks.

This is the only Luxation, proceeding from an external Cause, that has much need of a Bandage to keep it in its right position; because the Head of the *Clavicle* is larger than the Cavity of the *Sternum*, which besides has no Ledge

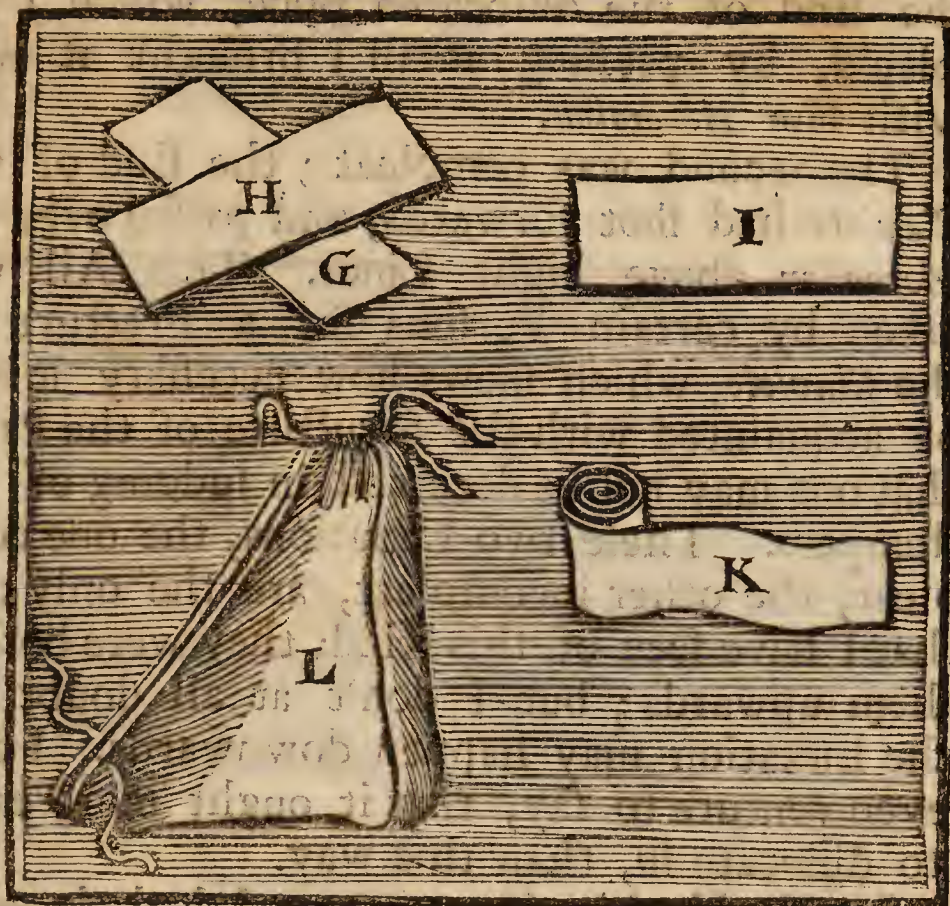
Ledge to retain it. Moreover the Ligaments are either forced or broken, and there is no Muscle that can restrain it.



In

Applica-
tion of the
Dressing.

In the Luxation backwards, the Roller (A) must form a Figure of eight, which draws the Shoulders backwards, and makes the internal end of the *Clavicle* advance forwards. This Bandage must have but 3 or 4 Circumvolutions, and must be made in such a manner that the disordered Part be left uncovered. It continues (if I may so speak) the Extensions and Counter Extensions that the Assistant made with his Knees and Hands. Whil'st the Assistant puts on this Bandage, the Surgeon directs it, and preserves the Bone he has reduc'd, in its Situation; then he trims the sinking in that is behind the Head of the *Clavicle* with the graduated Compress (B) or, which has succeeded with me on this Occasion, with Lint steeped in the White of an Egg, and Allum beat up together. This Lint is to be taken between one's Fingers, more or less, and steeped in the Remedy, and apply'd to the place that is most depressed; and one must trim successively all that hollow Space, which is called *Salt-Sellers* in Derision, to ridicule Persons that are lean. When this Pit is fill'd up even with the *Sternum*, and the *Clavicle*, three Compresses, must be laid on two that cross each other as (C) (D) and one (E) which covers them both. Over these Compresses must be made the Bandage *Spica*, with the Roller (K) the Crossings and Trusses of which are passed over the affected Part, to keep it in its Place.



In the other kind, one puts upon the Articulation very thick Compresses (G) (I) They must be kept in this Situation by the descending Bandage *Spica*. Both in the one and the other kind, the Arm ought to be supported by the Scarf (L). The Roller (K) ought to be four Fingers broad, and four or five Ells long.

The LUXATION of the external End of of the Clavicle.

I never saw the Luxation but twice ; the first First Ob-
 was incompleat ; the End of the *Clavicle* had servation.
 fall'd but a little from the *Acromion*. It was
 easily reduc'd by making the Extension, as has
 been

been directed, and leaning the Thumb upon the End of the dislocated Bone, which I replac'd, by pressing it till I brought it even with the *Acromion*.

Second
Observa-
tion.

The Second was compleat ; the End of the *Clavicle* had shot forwards, and passed over the *Acromion* above eight Lines. This Ail was taken by certain Persons for a Fracture of the *Clavicle*, which shews how necessary it is to be acquainted with the Structure of the Parts, that one may not be deceived in judging of Distempers. These two Luxations, the one compleat, the other incompleat, are the only ones that I have seen of this Kind; they were both of them upwards; but I don't at all doubt but the Luxation may happen downwards. I dare even venture to say, that it ought more easily to dislocate so, than this way.

Reducti-
on.

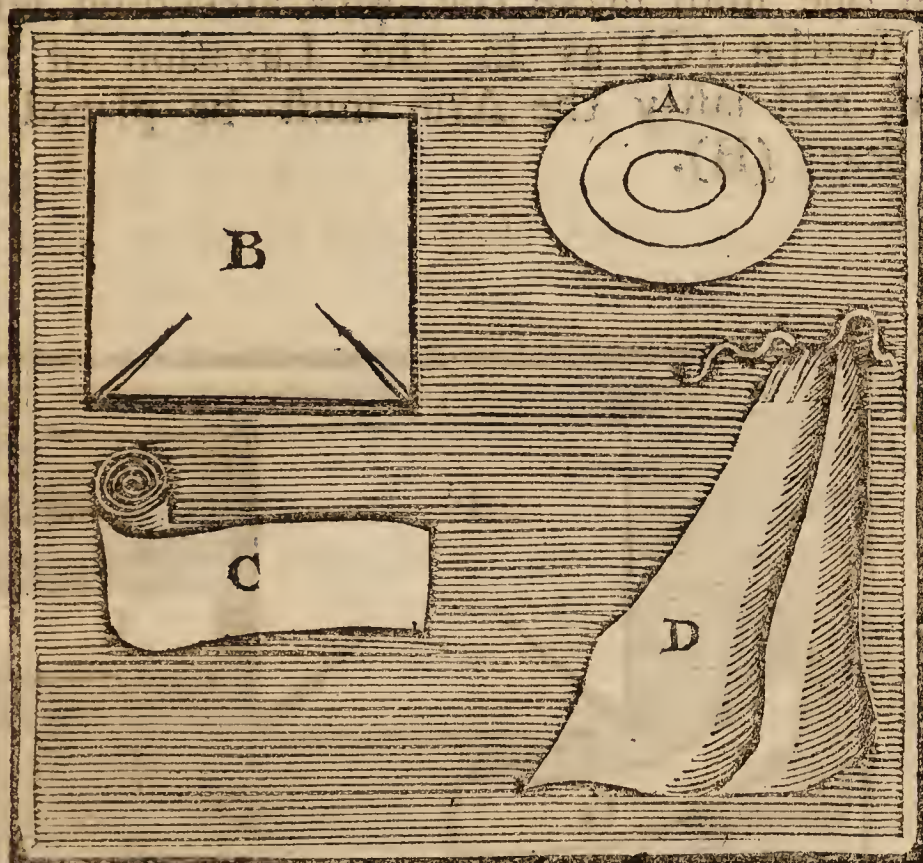
I reduc'd this Luxation as I had done the former, by rendering the Extensions stronger, and leaning my Thumb with more force upon the End that was rais'd; because the disjoining being more considerable, it requir'd more powerful Efforts.

Another
Reducti-
on.

If the *Clavicle* were luxated, beneath the *Acromion*, the same Extensions shou'd be used, the Head of the *Acromion* should be thrust downwards, and the End of the *Clavicle* rais'd.

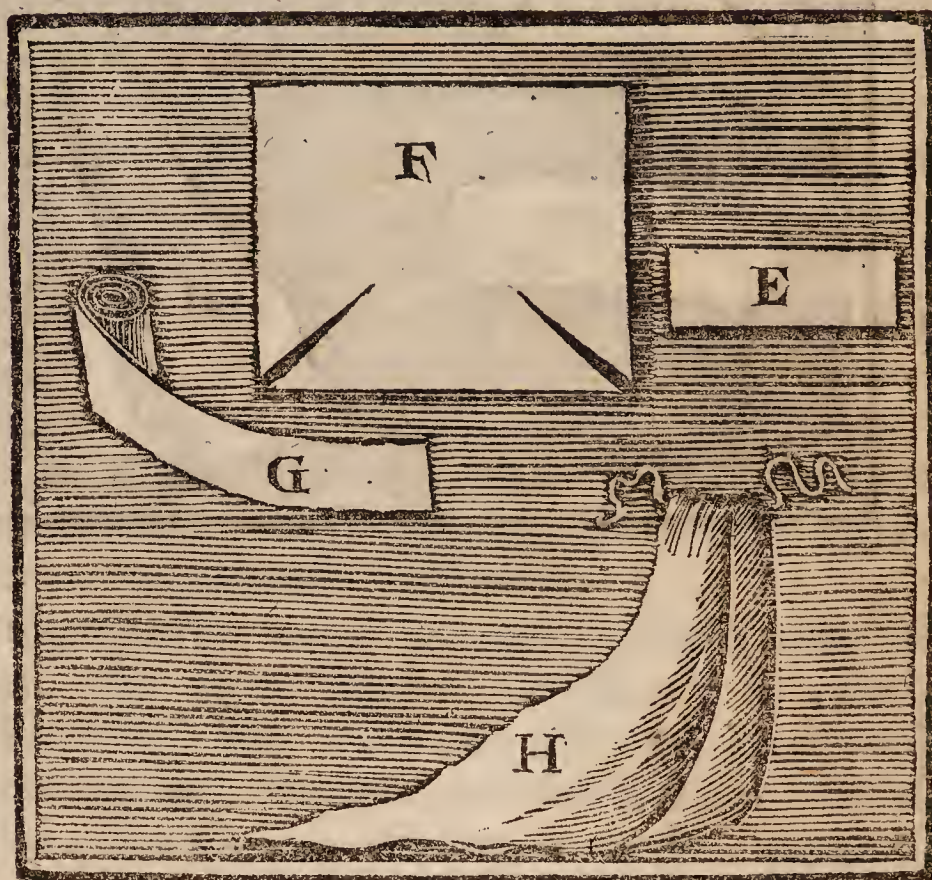
When the *Clavicle* dislocates at the End of the *Acromion*, the Dressing must be a gradua-

ted Compress (A) and upon the *Clavicle*, another Compress (B) which covers the stump of the *Humerus*, a Roller (C) the *Spica* descending, and the Scarf (D).



As

As for that which luxates underneath the *Acromion*, the Reduction being made, a thick Compress (E) must be clapt under the End of the *Clavicle*, and one of the same thickness (F) upon the *Acromion*, a third (I) must fold over the two first, and the stump of the *Humerus*; then one must make the *Spica* ascending with the Swathe (G) as in the Luxation of the Arm, and lastly the Arm must be placed in the Scarf (H).



CHAP. VII.

Of the LUXATION of the Arm.

THE Bone of the *Humerus* is articulated Structure
 with the *Omplata* by a *Poples* or *Genou*.
 This Bone has a large Head, and the Cavity
 of the *Omplata* is so shallow that it don't con-
 tain the sixth part of it. It only serves as
 (one may say) for a *Fulcrum* whereon on-
 ly one point of the Head bears, which abates
 the friction, and facilitates the Motion of the
 Arm. The rest of the Head is lodged under
 the *Acromion*, which together with the End of
 the *Clavicle*, forms a place of Refuge, where the
 Head of the *Humerus* and its Articulation are
 secured from external Injurys.

The *Processus Coracoides* is of some Use in Apophy-
 the Construction of this place of Refuge, or ses.
 second Socket; It limits it on the internal side
 and there is a strong Ligament, which goes
 from the Extremity of this Process to insert
 itself with the *Acromion*, and the *Clavicle* at the
 place of their Junction.

A Ligamentous Tunicle, which folds round Tunicle
 the Articulation, retains the *Synovia* which of the
 bathes it. Joint.

The Extent of this Tunicle, renders the Its Ex-
 Motions of the Head of the *Humerus* free and tent.
 easy, and the other Ligaments being also very
 loose in Proportion, give the Arm a wonder-
 ful facility in moving with quickness, and all
 manner of Ways.

This is the Articulation whose Motions are Motions
 most combin'd. The Arm is raised by the of the
 Muscles *Deltoides*, and *Supra-Spinatus*; it is drawn Arm.
 downwards by the *Rotundus Major* and the *La-
 tissimus*;

tissimus; it is carried forwards by the *Pectoral* and the *Coracobrachialis*; and is drawn backwards by the *Infra Spinatus* and *Sub-scapularis*.

Motions
of the
Arm.

Besides all these Motions it has a Million more, by the Conjunction of the Muscles; for it can move in all the Lines that can be drawn from the Centre of the Cavity of the *Omo-plata* to the Circumference; and besides it has a round and Semi-circular Motion.

Tonick
Motions.

The Motion round ways, is made by the Succession of the Muscles which assist in the four former Motions whereof I have been speaking, and which, when they all act together, keep the Arm stiff and firm any way whatsoever, which is what is call'd the Tonick Motion.

Semicir-
cular.

The Semi-circular Motion is, when the Arm is extended and raised. Then the *Deltoides* and *Supra Spinatus* sustaining it in this Situation, the *Sub-scapularis* make it turn from without inwards, and the *Rotundus Major*, with the *Infra-Spinatus*, turn it from within outwards.

Muscles
that pass
by the
Articula-
tion.

Besides all these Muscles just named, there are two more which pass by the Articulation, viz. the long *Extensor* of the Fore-Arm, which takes its rise from the Neck of the *Omo-plata*, and the two Heads of the *Biceps*, one of which is lodged in a particular Sinuosity in the fore Part of the Neck of the *Humerus*. It takes its Origin from the upper Part of the Cavity of the *Omo-plata*, the other comes from the *Processus Coracoides*.

The Blood Vessels, the Lymphatick Ducts, and the Nerves pass under the hollow of the Arm. This Cavity is fill'd with much Fat, and some conglobated Glands. It is formed,
by

by the Distance of the *Pectoral* Muscles, the *Latissimus*, *Rotundus*, and *Serratus Major*.

Here is a general Idea, of the Articulation of the *Humerus*, which is sufficient for the understanding, what I shall now say of its Luxation.

The *Humerus* usually dislocates under the Arm-pit: it also luxates sometimes before, under the great *Pectoral*, directly downwards on the nether Rib of the *Omo-plata*, and outwards under its Spine, but it cannot ever be dis-jointed directly upwards, unless the *Acromion* and the *Clavicle* be fractur'd.

It cannot be luxated directly upwards, be-cause the Muscles *Deltoides*, the external Head of the *Biceps*, the *Processus Acromion* and the *Clavicle* oppose this Luxation.

It is hard for the Head of the *Humerus* to dislocate directly downwards, as well because the *Extensor longus* of the Fore-Arm withstands it, as because it is very difficult for the Head of the Bone to remain on the nether Rib of the *Omo-plata*; nevertheless that Luxation has been seen. There are two Ways that are more easy; to wit, outwards and inwards.

When the Bone dislocates externally, it lodges under the Spine of the *Omo-plata* at the Root of the *Acromion*. This Luxation happens more seldom than the other, because the Muscles *Rotundus Minor*, and *Infra Spinatus*, have less Force to draw the Bone outwards, than the *Sub-scapularis*, the *Latissimus* and great *Pectoral* have, to draw it inwards. This depends still more upon the Situation of the Elbow, at the Time of the Falls as has been said elsewhere.

When the Head of the Bone slips inwards it may lodge it self in two Places, viz. under the *Pectoral* between the *Apophyses Coracoïdes*,

The
Kinds:

It cannot
luxate.

Difficulty
of its Lux-
ation.

The place
where it
lodges.

and the *Clavicle*, which cannot happen but with Difficulty ; or else under the Arm-pit, where there is a large Cavity, or to speak more properly, a Space that is only fill'd with Fat Membranes, Glands and Vessels, that easily give Place to the Head of the *Humerus*.

Remark.

'Tis proper likewise to remark, that the *Humerus* never dislocates but when 'tis at a Distance from the Breast, which always happens when one makes any Offer to save one's self in a Fall.

How the
Bone lux-
ates

Then, if the Fall be violent enough, and the Elbow comes to the Ground, the Head of the Arm, will be forc'd inwards, and the Luxation will be forwards under the *Pectoral*. If the Elbow is turned outwards, and a little raised, it will luxate downwards; and outwards, if the Elbow is turned inwards.

Remark.

The Arm must be considerably raised when it dislocates directly downwards, under the neather Rib of the *Omoplata*; but the Head of the *Humerus* can't rest long upon this Rib, because it is round, and the Breadth of this Rib is very small; therefore it will fall either inwards or outwards, but more easily inwards, for the Reason above-mentioned. This will happen every Time the Patient, or the Assistants who raise him, move the Arm without Precaution, for they will alter the Situation of the Head. It may even happen by unadvised Motions, made with a Design either to discover the Luxation, or reduce it.

Of the Causes.

Causes.

As to the Causes, Recourse must be had to the general Account. I shall only say that the *Humerus* dislocates with more Ease than any of the other Bones, because the Arm is the

Part

Part which first presents to save the Body, in Falls; and as 'tis that we make Use of to Defend our selves, it is the most exposed to Strains and Falls.

The Cavity of the *Omplata* is shallow, having Remark. no Fence but in the upper Part, where 'tis impossible it should luxate; it is so flat that it is not capable of retaining the Head of the Bone.

The Articulation of the *Humerus* is by a Ge- Remark. nou, and as its Head rests (as one may say) only upon one Point, 'tis easy to conceive that a middling Blow will make it break from its Axis, with less Difficulty, than the *Genou* of the Thigh, which has a deep Socket, and even with more Ease than any *Ginglymus*, which has always several Heads and divers Cavities, great Part of which mutually touch each other; besides that the Ligaments of the Arm are very loose, that 'tis not confined by a round Ligament like the Thigh, and that all its Motions are quick. These are the Reasons why the Bone of the Arm dislocates with more Ease than the others.

Signs that the Humerus is luxated downwards.

The Signs that the *Humerus* is luxated di- Signs. rectly downwards on the nether Rib of the *Omplata* are, that the Arm becomes longer, the Fore-Arm is stretched, the whole Arm is a little raised; the Patient is in Pain when one bends his Arm down, and finds Ease when it is a little raised. It puts him to Torment when one bends the *Cubitus*, and he is relieved upon stretching it out.

The *Humerus* is longer, because the Head of First Ex- the Bone is under the Cavity of the *Omplata*. plication.

- Second. The *Cubitus* is stretched, because the Head of the Arm thrusts the *Extensor Longus* backwards.
- Third. The *Humerus* is a little raised, because the Muscles *Deltoides* and *Supra-Spinatus* are stretched, being most at a Distance from their Origin.
- Fourth. The Patient is in Pain when his Arm is bent, because one stretches the *Deltoides* and *Supra-Spinatus*, which are already too much extended by the Removal of the Head of the Bone; and he finds Relief when one raises the Arm, because one abates the Extension of those two Muscles.
- Fifth. It causes Anguish, when one bends the Fore-Arm, because it stretches the *Extensor Longus*, which is already too much straitened: And it eases the Patient when one extends the *Cubitus* for a contrary Reason.
- Sixth. The Pain is felt from the Elbow to the *Omo-plata*, because that is the Extent of the long Muscle.

Signs of an outward Luxation.

Signs and
Explica-
tion.

The Signs that the Luxation is outwards, are, that the *Humerus* is brought near the Breast, because the Muscle *Coracoideus* and the *Pectoral* are extended. The Patient suffers when one removes the Arm from the Breast, because one forces the *Pectoral* and *Coracoidius*. Sometimes the Arm is longer, and seldom shorter. The more it is removed from the Cavity *Glenoides* of the *Omo-plata*, the longer 'tis; and the less 'tis removed, the shorter.

Signs

Signs that the Arm is luxated under the Arm-Pit.

When the *Humerus* is dislocated inwards under the Arm-pit, one finds a Cavity under the *Acromion*, and this Part of the *Omo-plata* seems more prominent. Signs.

There is a Tumour under the *Axilla*, the *Sequel*. *Humerus* is a little raised, and at a Distance from the Body; the Elbow is a little bent, and can't stretch but with Pain: The Patient suffers very much when one brings the Arm near the Breast. Sometimes the *Humerus* is longer then usual, but often shorter.

The Cavity that is observed under the *Acromion*, is that where the Bone of the Arm was before its Luxation, which makes that Prominence of the *Omo-plata* appear more than it ought. First Explication.

The Tumour that is under the *Axilla*, is caused by the Head of the Bone which is lodged there. Second.

If the *Humerus* is a little raised, 'tis because the *Deltoides* and the *Supra-Spinatus* are stretched; and if 'is removed from the Breast, that proceeds from the Contraction of the Muscles which draw the Arm outwards. Third.

The Elbow keeps bent, because the two Heads of the *Biceps*, which come from the *Omo-plata*, are distant from the Place of their Insertion. Fourth.

The *Cubitus* is in Pain when stretched, and the Patient finds Relief when 'tis bent, because that in the one the *Biceps* is extended, and in the other Motion 'tis put in a more natural Position. Fifth.

The *Humerus* is generally longer than usual, sometimes 'tis of an equal Length, and at Sixth.

Observa-
tion.

other Times much shorter than the sound one. If 'tis of equal Length, or longer, 'tis a Sign that the Head of the Bone is not raised higher than the Cavity of the *Omoplata*, and then all the Signs that we have just given will meet there. But if the Arm be shorter, from its having been forced under the hollow of the Arm-Pit, the *Cubitus* does not change its Figure, it is even indifferent either in Flexion or Extension, because the *Musculi Flexores & Extensores* are equally distant from their *Fulcrum*.

Signs that the Humerus is luxated forwards.

Signs.

When the Head of the *Humerus* has fallied forwards, it is lodged under the great *Pectoral* and *Serratus Major*, in the Space that is between the *Apophysis Coracoides*, and the *Clavicle*.

The Arm is not much shorter.

The *Cubitus* is a little bent.

The Elbow is at a greater Distance from the Breast, than in the Luxation downwards.

The Arm is less raised.

There is a Tumour under the *Pectoral*, between the *Apophysis Coracoides* and the *Clavicle*.

This *Apophysis* is defaced, that is to say, can't be perceived by the Touch even in such as are lean. The Cavity under the *Acromion* is less perceptible than in the Luxation downwards, and the *Acromion* does not jut so much out.

The Patient is put in Pain when his Elbow is brought near his Breast, and is relieved when one removes it a little.

First Ex-
plication.

The *Humerus* is not much shorter than in its natural State, because the Space between the *Processus Coracoides*, and the *Clavicle*, is but a Finger's Breadth more raised than the Cavity *Glenoides*.

The

The *Cubitus* is but a little bent, because the Second. Arm not being considerably removed, the Head of the *Biceps* is but a little shortened in Proportion.

The Elbow is more distant from the Breast, Third. because the external Part of the *Deltoides* being stretched, draws the Arm outwards.

The Arm is less raised, because the Head of Fourth. the Bone which is over it, keeps it from the Touch.

The Cavity under the *Acromion* is not so Fifth. perceivable as in the Luxations downwards, because the Head of the *Humerus* makes a great Sally, and sustains the *Deltoides* almost in its usual Roundness, and from the same Reason the *Acromion* does not jut so much outwards.

The Patient is put in Pain when his Elbow Sixth. is brought near the Breast, because the external Part of the *Deltoides* being extended, cannot be assistant in stretching it self out; and he is relieved when one removes it at a Distance, for the contrary Reason.

Prognostick.

First, this Luxation, which is one of the ea- Prognostick-
siest that happens, is also one of the least dan-
gerous.

An incompleat Dislocation of the *Humerus* would be yet less troublesome; it is reduced with a great deal of Ease. 'Tis this, without doubt, that certain Bone-Setters, and other Gentry, who sing their own Praises, pretend to have reduced without Help, only with the Turn of a Hand. To hear them one would think the Bones obeyed their Touch, and that not one made the least Difficulty of re-entring its
its

its Place, as soon as they clap their magical Hands upon it.

'Tis difficult to succeed when the Bone is before under the *Pectoral* Muscle.

That which is outwards is reduced with a great deal of Ease.

That which is directly downwards is the most easy to set, provided 'tis soon discovered, and one makes no Motion that may incline the Head of the Bone to fall outwards or inwards, which would render the Luxation more troublesome to reduce.

Remark. When the Head of the *Humerus* is luxated under the Arm-Pit, the Reduction is easy, if the Arm be either longer, or as long as it is naturally.

If the Arm is shorter, it is more difficult; insomuch that when the Head of the *Humerus* is sunk into the Hollow of the *Axilla*, one meets with a great deal of Trouble in making the Reduction.

It is very dangerous when the Head of the Bone is sunk so far in, that the Blood and Lymphatick Vessels and Nerves are compressed, because Numbness, Swellings and Defluxions will follow.

Remark. When Persons are Fat, the Reduction with Straps is difficult, because the Thickness of the Fat hinders the Straps from taking Hold of the Bone near enough, which makes them slip, and renders them unserviceable.

Remark. When Persons are very fleshy, the Reduction is hard to be made, by Reason of the Force and Resistance of the Muscles.

One may prognosticate from many other Things, but they who have Need of it may find in the General Prognostick whatever is wanting in the Particular.

Of the Cure of the Luxation of the Arm.

To reduce the Bone of the Arm in whatever Place its Head is lodged, the Patient must be set upon a low Chair, to the End that the Part which is affected, may be ready to make the Extension and Counter-Extension.

Cure of
the Luxa-
tion.

There are several Ways of performing these two Operations; but I will only examine and describe such as have been most in Use, shewing the Advantages and Defects of each in particular.

Many
Methods.

First Method.

The Extension and Counter-Extension are made with the Hands, by drawing the Arm above the two Condyles of the *Humerus*, whilst the Body is with-held or drawn, that it may not follow those who pull the Arm; for otherwise it would be impossible to make a proper Extension. The Surgeon, being placed on the Outside of the Arm, must have a Napkin tied about his Neck, wherein the Arm of the Patient must be put above the middle, then he must lay his two Hands upon the Upper Part of the Arm near the Shoulder, to the End that observing attentively the Degree of the Extension, he may conduct the Head of the Bone into its Socket, with his Hands, and the Napkin, which he raises up with his Neck, as soon as the Extension is sufficient.

First Me-
thod.

Manual
Operati-
on of the
Surgeon.

This Method is one of the best that is, and there is nothing in it contrary to Rule, but the Force, which is not always sufficient, unless it be in young Persons, or in any other Subject that is weak and infirm,

Second

Second Method,

There are some who keeping the Body fixed to some Place, pass the Arm between their Legs, and have it drawn by some strong Person; then when it is sufficiently extended, they take hold of the Upper Part of the Arm near the *Axilla*, to raise it and put it in its right Place.

Defect.

This Method has the Defect of the other, joined to one that is much greater; which is, that the Arm being bowed down to pass it between the Legs, the Muscles *Levatores* are too much stretched, and according to what we have said in General, they ought to be a little relaxed, as shall be more amply demonstrated in the Sequel.

Third Method.

The Ladder and the Door have been made Use of, and are still. In these two Methods 'tis not always Strength that is wanting, but a proper Situation of the Part.

When they would reduce the Arm with the round of a Ladder, or the Tops of a Door, they cover it with a Cloth folded in twelve or fifteen Doubles, they let the Ends of the Cloth hang down on both Sides, and make the Patient get upon a Chair or Stool of a Height convenient, that his Arm may be even with the Door, or Step of the Ladder that is trimmed with the Cloth. Then the Surgeon mounts upon something that is firm and higher than the Stool whereon the Patient stands, that he may be in Readiness to make good Use of his Hands. He passes the dislocated Arm
over

over the Door or Ladder, he has it held steady by two or three Persons, who draw it, and bring it near the Door, then he puts his Hands upon the Part affected to observe attentively what passes. He removes the Stool from the Patient's Feet, and the Body being abandon'd, to its own Weight makes the Counter Extension, whilst they who draw the Arm on the other Side the Door make the Extension. They who follow this Method say the Reduction is made when the Arm, the Door, and the Body are in three parallel Lines, which shall be prov'd to be false.

This Method is very antient, one may say *Pernicious* that 'tis deriv'd from the *Greeks*. If they who *ous Ways*, follow it are ignorant of its Defects, I am going to demonstrate them, and I hope to banish from their Chirurgical Arsenal these Instruments, which create as much Horrour as they are *Pernicious*.

To shew in what the Door and Ladder are pernicious, it must be observed that there may be too much, or too little Strength; that one is not Master of it to give it a due Proportion, and that if it happens to be so, 'tis pure good Fortune. In Effect, if a lean Man has a Luxation where the Head of the Bone is lodged in the inmost Part of the Arm-pit, the weight of the Body, which in this Method is the Principal Cause that acts; would not be sufficient, and the Extension would be imperfect.

If on the contrary, a fat Man has a Luxation where the Head of the *Humerus* is not quite sunk into the Cavity of the Arm-pit the Weight of his Body will have a force infinitely Superiour to the Resistance of the Muscles; and that which is more than sufficient for reducing the Luxation will cause fatal and perhaps incurable Disorders

Disorders, as a Rupture of the Muscles, Tendons and Ligaments.

Observa-
tion.

After Reductions made by the Ladder or Door, there have been observed profound Contusions on the Ribs, under the *Axilla*, and in the inside of the Arm along the Vessels, which have been followed by very fatal Imposthumes. I have seen in the like case the Trunk of the Brachial Artery opened, which instantly caused a very great Aneurismal Tumour, whereof the Patient dyed. It took up the inward Part of the Arm, the Cavity of the *Axilla*, and the Bottom of the *Pectoral* Muscle. Another Time I saw the Bone of the Arm broken near its Neck by the Efforts of some who try'd to make the Reduction with the Ladder.

Acci-
dents that
happen.

This Method is always fatal when one does not succeed, and it often happens even when the Bone is reduced, that after these Strains, the Joint becomes inflamed or paralitick; or that an *Anchilosis*, a *Purulent Disfluxion*, *Oedema*, *Dropsey in the Articulation*, and many other pernicious Symptoms ensue. I have often known the Limbs deprived thereby of their Strength and Motions, which the taking the hot Mineral Waters for several Seasons had not cured without great Difficulty. I have seen the Bone disjoint of it self in a little Time after reducing of Luxations by this Method; and the Patient could not be cured without a great deal of Trouble, by all the Remedies and Means laid down in the Cure of Luxations in general.

Fourth Method.

There are some who make the Reduction with their Heel, laying the Patient at his length upon the Ground, pulling off their Shoes and
laying

laying themselves by his Side with their Feet to his Head. If they are to reduce the left Arm, they place the Sole of their left Foot under the Arm-pit, and taking hold of the Fore-arm above the Wrist, they push with their Feet while they draw the Arm with Force, by which they make the Extension, and Counter-extension, and the Bone is sometimes reduced.

This Method has two Faults; the first is that the Situation, proper to the Muscles, that raise the Arm, is not observed. The Second is, that the Fore-arm, is pull'd, and I have prov'd before in the general Account of Luxations, that the Extensions should be made by pulling that very Bone which is dislocated.

Fifth Method.

Being at the Army, a Surgeon Major, seeing me reduce an Arm, told me, that he had several Times had Success in seating the Patient upon a Chair, and himself upon another of equal Height besides him, with his Face towards his Patient. That if 'twas the left Arm, he put the Palm of his left Hand under the Arm-pit as far as he could, as if he would feel the Articulation; that he afterwards leaned his Elbow upon the Patient's Thigh, and with his Right Hand took hold of the lower Part of his Arm; then bending it down with a sudden Jerk, whilst his Right Arm leaning upon the Patient's Thigh, serv'd as a Buttress against the *Axilla*, he made it turn upside down and reduc'd it.

This Method has the Defect of *Hipocrates's Ambi*, and none of its Perfections.

Sixth Method.

The
Ambi of
Hippocrates

The Instrument call'd *Ambi* was invented by *Hippocrates* to reduce the Arm; it is composed of two Pieces of Wood join'd together by a Hinge. When 'tis made Use of, the two Pieces make a right Angle, the one which serves for the Supporter, is parallel to the Body of the Patient, and the other which serves for a Leaver, is parallel with the Arm. The *Humerus* is fastened to it by several Straps; the Angle of the two Pieces is under the Arm-pit and when the Reduction is to be made, the Leaver, or Branch of the *Ambi* to which the Arm is fastened, is bowed down, and the Right Angle becomes acute, which makes the Extension Counter-Extension and Reduction of the Bone at the same Time. This Machine has a great many Excellencies.

First Per-
fection.

First, the Arm is placed as it ought for the Relaxation of the Muscles.

Second
Perfection.

Secondly, It has a sufficient Force, and one might give more by lengthening the End of its Leaver.

Third
Perfection.

Thirdly, the Extension and Counter Extension are of an equal Strength, being produced and actuated by the same Cause, and at the same Time which is an essential Thing, in all Machines that are made Use of for reducing Luxations.

Description

Description of the Ambi, and the Manner of using it.

(A) (A) (A) The Arm fastened by three Straps to the Leaver or Branch of the *Ambi* mark'd (B) (G) (D.)

(B) (D) is the other Branch, with its Foot (D.) It serves as a Stay for the Leaver, (B) (G) which is joined by a Hinge to the Point (B.) (D) (B) (G) is the right Angle form'd by the two Branches of the *Ambi* when the Arm that is fastened is placed in its right Position.

(G) is the end of the Leaver whereupon the Surgeon leans with all his Might, to bring the end (G) nearer the Point (D) by describing the Curve Line (G) (D.)



Defects of the Ambi.

First Defect.

The first Defect of this Machine is that it thrusts the Head of the Bone into its Socket before the Extension, and Counter Extension is made. This is not proper, because every Thing opposes the Reduction when the Bone is not sufficiently distant from the unnatural Place which it took up; whereas it reduces as it were of it self, when one has sufficiently stretched the Limb, and brought the Head of the Bone to a Level with its Socket.

Remark.

Experience shews us, that to make the Reduction with Ease, one ought not to thrust the Head of the dislocated Bone into its Socket, till sufficient Extensions are made, without which all Attempts are unprofitable. In using the *Ambi* one falls into this Error, because it thrusts the Bone towards its Socket at the same Time that it extends the Arm. The Defect of the *Ambi* is always found, whether the Ladder or the Door are used, as some have experienced, to the Disadvantage of the Patient.

Seventh Method.

Manner of Reduction with a Stick.

There are also several other Methods laid down by the Antients to make the Reduction of the *Humerus*: As to place a Stick upon the Shoulders of two Men of equal Strength and Bigness, and to raise up the Patient with the Stick, which is put under the *Axilla*, whilst his Arm is with-held, and the Weight of the Body left to act, as when one uses the Door or Ladder.

Eighth

Eighth Method.

Others have the Patient's Arm taken by a taller Man, who on a sudden places the *Axilla* of the Arm affected, upon the Edge of his Shoulder, letting the Body hang upon his Back, whilst he keeps the Arm before him with both Hands.

All these Methods have the Defect of the Defect. Door, the Ladder, and the *Ambi*; and all of them only tend to raise the Head of the Arm-Bone. It seems as if they who proposed them, had not known any other Sort of Luxations than such as happen downwards; nevertheless we have proved that the *Humerus* sometimes dislocates outwards, and very often forwards. I have seen this last Luxation thrice in one Month; therefore the Methods ought not to be the same for reducing all Kinds. I will now offer that which I have used with most Success.

Remark
upon Au-
thors.

Observa-
tion.

If any Method is preferable, 'tis that where- in one can re-unite the five following Proper- ties or Conditions.

A Me-
thod that
is prefe-
rable.

First, that there is sufficient Strength.

Two Pro-
perties.

Secondly, That the Strength is not too great.

Thirdly, That this Strength acts upon those very Parts that are dislocated, and not upon the Parts adjoining.

Fourthly, That it is equally adapted to Ex- tension and Counter-Extension.

And Fifthly, that the Means employed in drawing, don't hinder the guiding the disjoin- ted Bone into its natural Place, by the same Way which it took to leave it, at least as near as possible; and that this be not

Remark.

H

done

done at the same Time as the Extensions, and Counter-Extensions.

If one reflects upon what I have said of Luxations in general; and the different Methods I have just described, 'twill be found that these Things are absolutely necessary, and that the Want of one renders all the others vain. I shall not explain them farther, the rather because they are to be met with in the subsequent Method.

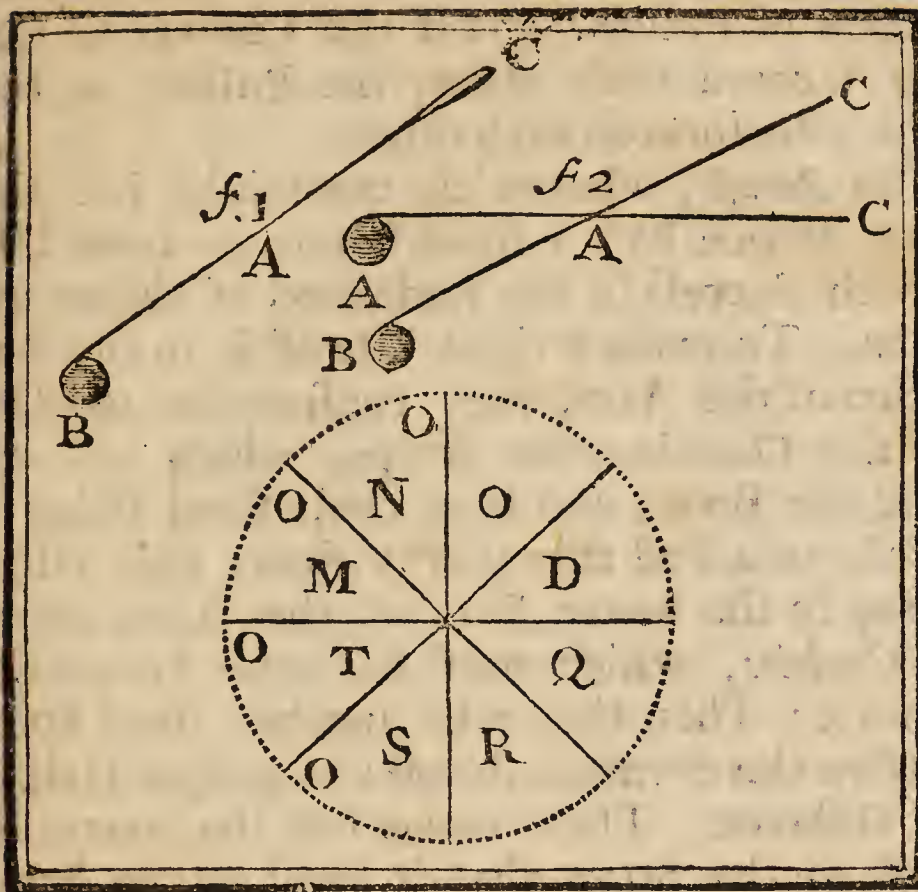
Ninth Method.

The
Moufle.

All the World knows that the *Moufle* is a Machine composed of divers Pullies, set in one and the same Case. The Force of this Engine proceeds from this, that the Pully is a perpetual Leaver, and that there must be several Pullies to make a *Moufle*.

To shew that the Pully is a perpetual Leaver, look upon the Figure on the other Side,

which



which represents a single Leaver. The fixed Point is at (A) the Weight at (B) and the Power that moves it at (C) then join to it a second Leaver (A) as in the 2d Figure, you will have the Beginning of a Wheel; and if you add yet two or three more, you will have a compleat Wheel, as may be seen in the 3d Figure, where four Leavers (O) (O) (O) (O) which have all the same Centre, make a Pully. And if instead of four Leavers, whereof this is composed, you can imagine as many as will fill the Places (M) (N) (O) (D) (Q) (R) (S) (T) you will have a full Pully. Then it is plain that the Pully is the strongest of all Machines, since it is made of so many Leavers, which succeed each other in Proportion as the Pully turns; now the Mechanicks tell us that the Succession of Leavers multiply the Force.

If the Pully has so much Force, the *Moufle* Force of the Mou-
 ought to have more; for if the one is the Multi-
 H 2 tipli-

tiplication of Leavers, the other is the Multiplication of Pullies; and if the Leavers of the Pulley succeed each other, the Pullies of the *Moufle* also succeed each other.

The Use of Mou-
fles in
Reducti-
on. The *Moufle*, wherewith one might lift the Earth, if one had a fixed Point, is made Use of with Success in the Reduction of dislocated Limbs. To make a right Use of it in the Reduction of the Arm, they confine the *Omo-plata* and the *Clavicle* with Straps, which also tie round the Body, and have their fixed Point in a Wall, or a Post that is very firm; they fasten a Strap to the lower Part of the Arm, above the *Condyles*, which must have the Properties requisite: Then they take another fixed Point to fasten the dormant *Moufle* at a proper Height and Distance. They make fast the moveable *Moufle* to the Strap that is fixed to the Arm; they give the Cord to somebody who draws as long as they desire, while they keep their two Hands upon the Articulation to observe what passes there, and watch attentively the Minute when they must work to replace the Bone. This Minute is the Time when the Extensions are sufficient, which is known by the Signs beforementioned.

When the Surgeon sees that the Muscles are sufficiently stretched by the Extensions, he goes to work, but differently according to the various Kinds.

Different
Ways of
working. If the Bone is dislocated downwards, he must take hold of the Arm, as near as possible to the Arm-pit; the four Fingers of each Hand not making a Circle round the Arm, but being placed a little obliquely, their Ends turned towards the *Axilla*, in the inner Part of the Arm, the Palm of both Hands leaning, the one upon the Muscles *Flexores*, and the other up-
on

on the *Extensores* of the *Cubitus*; in such a Manner as that his two Thumbs, and the two *Thenars*, may be parrallel to each other, and placed on the external Part of the Patient's One Way Arm. The Wrists and the Elbows must also of working be a little near one another: This Posture of the Surgeon's gives him the Liberty of raising easily the upper Part of the Arm with his Fingers, of bending the lower Part with his Elbows, which may be executed readily: For in bending down his Elbows, he will bow the lower Part of the Arm, and in raising his 8 Fingers, he raises the Head of the *Humerus*, which will conduct it into its Socket, by making it (if I may so say) turn topsy turvy.

If the Head of the *Humerus* is turned out-wards under the Root of the *Acromion*, and the Spiny *Apophysis* of the *Omo-plata*, the Surgeon being on the outside of the Arm, shall (after the Extensions being sufficiently made with the *Mouffles*) lean the Palm of one Hand upon the lower and inner Part of the Arm, and the other upon the upper Part near the Shoulder. Then, thrusting strongly with both Hands, let him push the lower Part of the Arm outwards, and the upper inwards, which will force the Head of the *Humerus* into its Socket. Another Way.

When the Head of the *Humerus* is dislocated forwards under the great Pectoral, between the *Apophysis Coracoides*, and the *Clavicle*; they make in the like Manner Extensions with the *Mouffle*, and when they are sufficient, the Surgeon thrusts the Head of the Bone into the Cavity of the *Omo-plata*, by pushing with one Hand the lower Part of the *Humerus* from without inwards; and with the other, the upper Part of the *Humerus* from within outwards. Another Way.

Prologue.

This Method of reducing the *Humerus* with *Moufles* is simple; it would be preferable to all others, if the *Moufles* carried with them their fixed Point. 'Tis this that has rendered it necessary to reduce them into the Composition of a Machine, which can carry with it the fixed Point for Extension and Counter-Extension. 'Tis not of yesterday that Machines of this Kind have been invented for the Reduction of Bones. We have *Hippocrates's* Bench, which has been in Use many Ages, and which has been brought to Perfection by several Surgeons, the late Mr. *Michau* had succeeded more than any one; but his Machine did not answer all the Purposes that might be desired.

History
of the
Machine
for redu-
cing Lux-
ations.

In 1702. I endeavour'd to correct *Hippocrates's* Bench with some Success; but, in Spite of this Correction, I found so many Defects in it, in a Tryal that I made of it on a Luxation of the Thigh, that I resolv'd upon inventing a Machine entirely new. I made it publick in 1705, in the first Edition of this Treatise, in a publick Course that I went thro' at St. *Cosmus*. In 1706 I expos'd this Machine which I had improved a second Time. It serv'd me successfully several Years, but the Reflections that I made upon continual Practice engag'd me to form divers Observations on it, and I thought in its utmost Degree of Perfection, when in 1710 a Luxation of the Arm, of Six Months of standing, foil'd me. I found out the Cause it, and added a Piece, wherewith I succeeded the next Morning. In 1716 I presented it to the Academy; it is in the Memoirs of that Year. I us'd it with Satisfaction, until new Difficulties arose in Cases which I could not foresee. This has induc'd me to make new Corrections in that which I now reccommend.

Its Pro-
gress.

It

It has in it all the Properties of the first, and a great many others, which I shall particularize in the Description I now make of it. All these Improvements successively, shew that one must arrive at Perfection by Degrees; and that Perfection in human Inventions is a Thing merely relative.

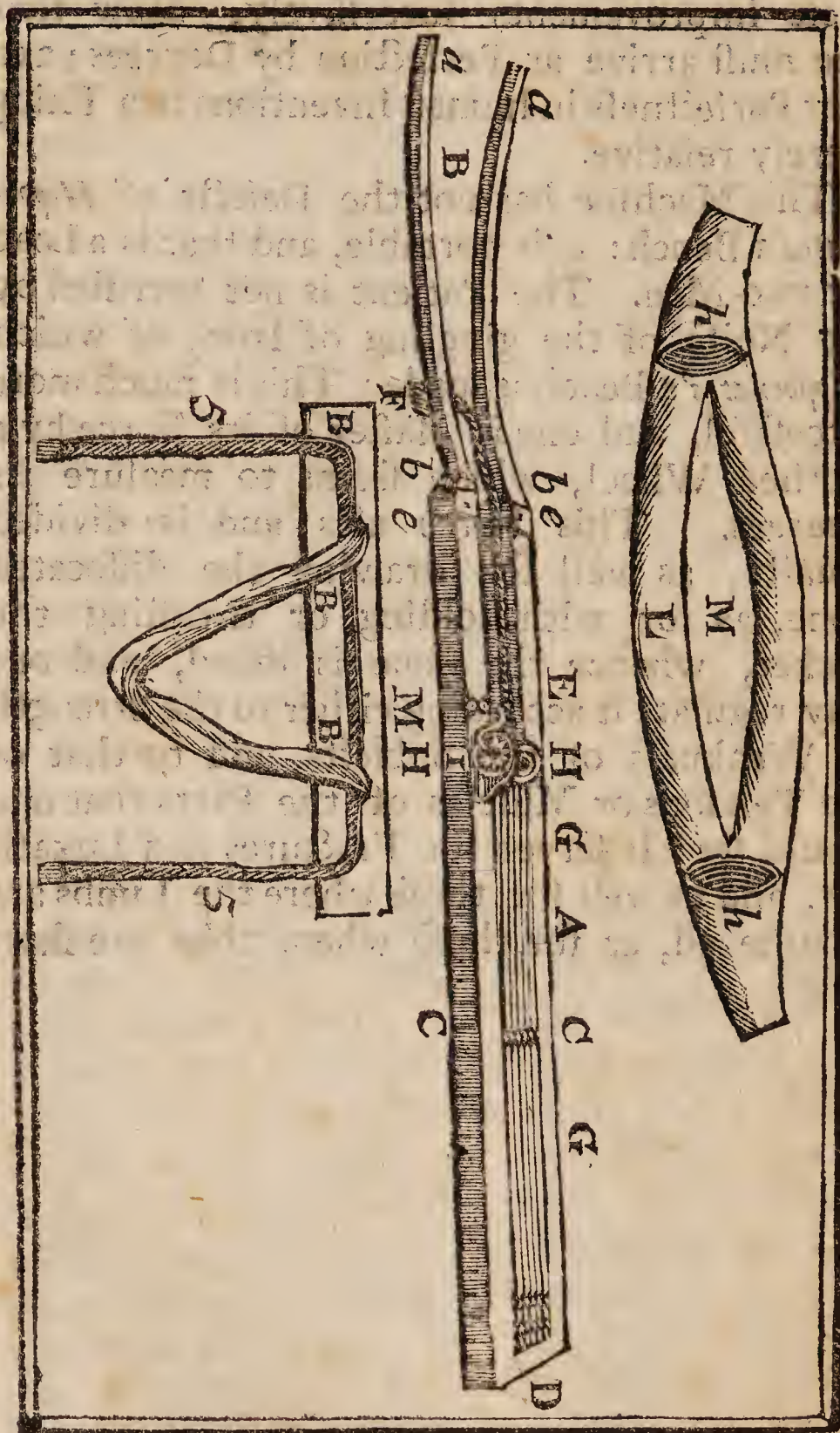
This Machine has not the Defects of *Hippocrates's* Bench: it is portable, and that is a Load for two Men. The Patient is not terrified by the Noise of the gingling of Iron, of which *Hippocrates's* Bench is made: This is much more successful, and one is Master of its Force by a toothed Wheel, which seems to measure its Degrees. This Force acts and is divided equally, as well for drawing the dislocated Bone, as for with-holding or thrusting the Socket, whence the Bone is issued, and one may regulate it according either to the Strength or Weakness of the Subjects, and to that of the Tendons or Muscles of the Parts that one would set: It serves for Fractures and Luxations, and as well for those where the Limbs are lengthened, as for those where they are shortened.

Advantages of this Machine.

Descrip-

H

Description of the New Machine.



This Machine is of two Parts. One which is called the Body (A) and the other which I stile the Branches (B.)

The

The Body is composed of two Cheeks (C) (C) of Oak, (which are strait and parallel to each other) two Foot eleven Inches long, two Inches broad, and eighteen Lines in Thickness. Description of the Body.

They are distant from each other sixteen Lines. There are two Traverses or Cross-Pieces, which hold them together, and are pinn'd to them by Tenons, Mortises, and Pins. One of these Cross-Pieces is placed at the End of the Cheeks; it is even with them on the upper Side, and within four Lines of the lower one, to leave Room for a little Plank which enters therein like a Groove, whereof we shall speak hereafter. The other Traverse or Cross-Piece, is two Foot five Inches distant from the first, and is even with the Cheeks underneath, but on the upper Side wants four Lines of it; it is also cut hollow, Arch-wise, for the Passage of a silk Cord, whereof Mention shall be made hereafter: It is joined like the other to the thick Part of the Cheeks.

Between the Side of the two Cheeks that face each other from the lower Traverse to the upper, there are two Grooves or Gutters; one is in the middle of the thick Part to lodge the Tongues of a wooden *Mouflet*, which shall be described hereafter. The other Groove is even within two Lines of the under Part of the Cheeks. It gives Passage to the Tongue of the little Plank abovementioned, which is ten Lines broad, (without comprehending its two Tongues) four Lines thick, and two Foot five Inches long; insomuch, that being in its Place, it stops up two Foot five Inches Space between the two Cheeks. It passes under the first Traverse, and goes on to join it self even with the lower Part of the second. The Remainder
of

of the Space that is between the Cheeks, is filled up by a little Plank five Inches long, and of the same Thickness and Breadth as the first, which is fixed at the Place where the first enters into the Groove, whence it can be drawn out to give Liberty for fitting the *Moufles*, and their Cord also; or for taking them out and mending them according as is necessary. These *Moufles* are two; the one dormant; which is joined by a Tenon introduced into the Mortise that is made in the Traverse, at the End of the two Cheeks. A Peg (D) passing thro' the Traverse, penetrates the Mortise and Tenon of this *Moufle*, and keeps it dormant. The other *Moufle* (E) is moveable; it has two Tongues which enter into the Grooves of the two Cheeks, and give it the Liberty of moving backwards and forwards. At its Head are Holes, thro' which the Strings of a double silk Strap (F) pass, which is 6 Lines broad, an Ell long, and of a Triple Weft. This Strap has divers Knots about two Inches distant from each other; the Knot which is at the Extremity serves as a Button, and the Spaces which the others leave between them, are as the Holes wherein one fastens the first Knot, which forms a Loop wherein the Strap (B) is fixed, which draws the Limb that is to be set. There are several of these Button-holes (if I may so call them) the one near the Button, the other at a Distance; they are all used to fit the Strap to the Length of the dislocated Part.

Descrip-
tion of
the Mou-
fles.

There are two *Moufles*, the one dormant, as has been said, the other moveable; their Case is of square Wood: Each of them has six Pul-
lies, those of the first Row have one Inch Di-
ameter, those of the second ten Lines, and all
of

of them are three Lines thick. One runs thro' a filk or flaxen String, of a Line and half Diameter, and 27 or 28 Foot long, whereof one End is made fast to the Case of the dormant *Moufle*, beneath the Row of small Pul-
lies. The other End of the String is fastened to the Eye of a Pin which goes thro' the Axle-Tree, whereof we are going to speak.

Two Foot from the End of each Cheek in their thick Part, two Beams, or upright Pieces of Wood (H) (H) rise up like Walls 28 Lines high, and 8 in Thickness, even with the outward Part of the Cheeks. They are joined by Tenons rounded at Top, and pierc'd by an Iron Linch-pin of four Lines Diameter, the two Ends whereof are Square, and go beyond the Beams an Inch of the *Radius*. The Linch-Pin carries between the Beams a wooden Axle-Tree, turned like a Bobbin, of an Inch Diameter, thro' which runs a little Iron Pin that is riveted at one End, and has an Eye at the other, wherein one of the Ends of the String is made fast. At the exterior Side of one of the Beams, there is an inchasing of 16 Lines Diameter, hollowed within four Lines of its Thickness, wherein an Iron-Wheel (I) is set, of 15 Lines Diameter, and two in Thickness, thro' which the Linch-pin passes. Its Teeth, which are made Rock-wise, are ingrail'd with, and check'd by, the Beak of a Spring 30 Lines long, 4 broad, and half a Line Thick, shaped like a *Roman* (S) whereof the End that is most bent is fixed by two wooden Screws on the Ledge, of the Thickness of the Cheek. At the End of the Spring, which I call the Beak, and which is ingrailed with the Teeth of the Wheel, there is, on its convex Side, a little Catch, which, when drawn, serves to disengage the

The Beams.

The Axle-Tree.

The toothed Wheel.

The Spring.

the Spring from the Teeth of the Wheel when 'tis requisite to relax the *Moufles*. This Spring is supported by, and rests upon, a little Iron-pin, of one Line Diameter by 4 of Projecture, which enters Screw-ways into the Notch, &c. of the Beam, which lodges that Part of the Spring, which is check'd by the Teeth of the Wheel.

Descrip-
tion of
the
Branches.

The Branches of the Machine are also composed of two wooden Cheeks (a) (a) but they are neither strait, nor parallel with each other. They are arched before like a Bow, whose Arrow is 18 Inches long; their Length is 2 Foot 3 Inches, including a Tenon 4 Inches 9 Lines long, by 8 Lines Diameter. These Tenons come out of the Part which is strongest, and is as the Basis or Root of the Branches. This Basis (b) (b) is Square, of the same Breadth and Thickness as the End of the Cheeks that belong to the Body of the Machine: It rests upright upon this wooden Surface, and the Tenon of 4 Inches 9 Lines enters into the Cheeks of the Body of the Machine, and touches, with three of its Sides, 3 Sides of a Sort of Mortise made of the like Size, in the Fore-part of the Cheeks that belong to the Body of the Machine, insomuch that the End of the Tenons rests upon the Traverse that is above the Axle-Tree. And to give the End of these Cheeks strength enough to retain these Tenons, and the Basis of the Cheeks of the Branch, they are supported by an Iron Ring (e) (e) which covers them all but the Sides whereby they face each other, where Passage is left for the filk Strap. This Ring is an Inch broad, and a Line thick; it is retained by three wooden Screws; one upon the little dormant Plank, and the other two on the Fore-part of each

each Cheek. The Tenons are parallel, but the rest of the Cheeks are not. At their Basis they are only 16 Lines distant, they are held together by two Traverses, the first begins within an Inch of their Basis, and is 18 Lines broad, and an Inch thick; as for its Length between the Cheeks, it has 16 Lines toward the Basis, and 18 towards the Extremity of the Cheeks, because that as soon as the Cheeks begin to grow distant from each other, the second Traverse, which is but 14 Lines from the first, is 20 Lines long between the Cheeks towards the first Traverse, and 2 Inches towards the End of the Cheeks; which Cheeks continuing to grow yet more distant, are at their Ends 7 Inches and a half distant from each other.

The Traverses are joined to the Cheeks by Mortises and Pins with covered Joints, they are flat above, and round underneath. The Cheeks or Branches do not retain their Square Figure, which they have at their Basis, where they are fitted to the Cheeks belonging to the Body of the Machine; they are octogonal the rest of their Length, and decrease gradually, so that they have one Inch Diameter at the first Traverse, and but 8 Lines at their Ends, where they are blunt and rounded that they may lodge themselves easily in two Sheaths, which are at the Ends of a Sort of Strap that I call Buttress, and shall describe hereafter.

To make Use of this Machine, one must have two other Pieces, the one serving to withhold the Body, and the other to draw the Limb. I call the first the Buttress, and the second the Strap. The Buttress (L.) is made of a Piece of Ticking, a Foot long, and 3 Inch-

The
Manner
of making Use
of the
Machine.

The
Piece
that
makes
the Coun-
ter-Ex-
tension.

3 Inches thick, with a Sort of Button-hole in the middle according to its Length: This Slit or Button-hole is 9 Inches long; the Remainder of the Ticking, which is not slit, equally limits both; underneath each of which Limits there is a Pocket or Sheath (b) (b) made, which, as I have said, serves to lodge the Ends of the Branches of the Machine. This whole Piece of Ticking is lined with Shammy, that it may not hurt the Body nor the Limb, which is to pass thro' the Slit (M) 'Tis thus that the Body is with-held by this Buttress.

The
Piece
which
makes
the Ex-
tension.

The Piece which serves to draw the Limb is called the Strap, and is made of a Piece of Shammy, double and stitched, being 14 Inches long, and two and a half broad. In the middle of it, length-ways, is a silk Cord (5) (5) of a double Weft, 3 Quarters of an Ell long, and ten Lines broad, which passes thro' the two Loops of a Boot-strap covered with Shammy. The silk Cord is sowed to the Piece of Shammy, about the middle of the Cord, and near each End of the Shammy, so that the Stitching does not hinder either the removing the Loops of the Boot-strap from, or bringing them nearer to, each other; so that it may suit with the different Sizes of the Limbs to which 'tis fastened.

This Strap (B) (B) which is 18 Inches long, and one broad, makes a Loop of nine Inches, thro' which the silk Cord, which is fastened to the Head of the moveable *Moufle*, passes. The Piece of Shammy (B) goes round the Limb, and is put in the Room of the circular Compress which 'tis customary to use, to avoid the Strap's hurting. I make use of Shammy which is much softer than Linnen. The silk Cord (55) goes twice round the Shammy, passing

ring a second Time thro' the Loops (BB) after which it is fastened and ty'd to a Knot and a Rose; this done, the Machine entirely mounted must be placed under the Limb, and the Ends of the Branches must be made fast in the Pockets or Sheath (*bb*) of the Buttress (L.)

The Strap (F) of the moveable *Moufle* (E) Working must be put thro' the Loop of the Strap (BB) of the which is fastened to the Limb; and its Knot Machine must be fixed, in passing by, in one of those Button-holes; then one puts on the Handle marked in the Machine (M) at the Linch-Pin of the Axle-Tree, and turns as much as is requisite for the Extension and Reduction of the dislocated Limb.

I have render'd this Machine much more portable than heretofore; it was both longer, broader, heavier, and of one single Piece; and this takes in Pieces into two: It is also easier to work, since the Operator may govern the Handle with one Hand, and the dislocated Part with the other. Proper-
ties of the
Machine.

The Branches arched like a Bow, leave a Space between them and the Limb, which renders them convenient for passing the Hand under both for judging of the Progress of the Extensions, and for thrusting the Bone where 'tis proper. Besides, the Branches of the first Machine being strait, the Limb was incommoded; moreover the Buttress not being slit, did not with-hold the Body so exactly as this; and the new Strap, which serves to draw the Limb, is much softer, stronger and easier to apply.

Example serving as a Recapitulation.

These Sort of manual Operations can't be Repetited too often, wherefore, to the End that on
young

young Surgeons may the better understand it ; I will suppose the Arm dislocated, and will shew them all that must be done either before, during, or after, the Operation.

Before the Operation, one must place the Patient well, and examine well the kind of Luxation, having the Machine and Dressings all ready, and applying the Straps to it.

He must be upon a Chair two Foot high, the sound Part leaning against the Back of it, which, if possible, must be but a Foot and half high ; and the dislocated Side must be free and disengaged from all Things that are capable of troubling the Operator.

The Part must be examined, and 'twill easily be found where the dislocated Bone is lodged, provided one comprehends well all the Signs that we have given to distinguish the different Kinds mentioned heretofore.

Disposition of the Machine.

The preparing of the Machine consists in joining its two Parts together, in removing the moveable *Moufle* from that which is dormant as much as can be, and in taking Care that the Cords are not intangled ; in this Case one applies it as is shown hereafter.

For the Dressing ; the Figure whereof is represented hereafter.

Dressings.

There must be a Compress folded 8 double, 8 Fingers Breadth long, and 4 broad ; another Compress cut like a half Cross of *Malta*, 8 double, 8 or 9 Inches long and broad : Another Compress between 7 and 8 Inches broad, 4 double, and a Foot and half long ; two Rollers, one six Ells long, and 2 Inches and a half broad ; and the other 2 Ells long, and 2 Inches broad :

broad: A roll'd Compress, a Pellet, and a Scarf for the Hand.

In applying the Strap, regard must be had to divers Things: First to have the Skin of the Arm well drawn up by the Hands of an Assistant, who keeps it raised during the Application of the Strap, to the End that from the Strap to the Arm-pit there may be as much Skin as possible. When one does not take this Precaution, it happens (especially in fat Persons) that all the Efforts of the Extension act only upon the Skin: The Bones and the Muscles are not drawn, and one can't remove the Bones at a Distance enough to reduce them.

Circumstances to be observed.

First Circumstance.

Secondly, to lay on the Piece of Shammy (B) instead of a Linnen Compress, immediately above the *Condyles* of the *Humerus*, then to place and tie over it the Strap mark'd (BB) to bind it very hard least it should slip; to tie it even twice, and with more Strength, on those who are pretty fat, without which the Strap would not come near enough the Bone of the Arm, nor bind it close enough; and the Force wou'd act upon the Fat, and have no Effect upon the Bone which is the essential Point.

Second Circumstance.

Thirdly, the two Parts of the Strap which make the Loop, must be placed, one before the external *Condyle*, and the other behind the internal one. 'Tis proper to observe this Position; because if these Parts of the Strap were upon the *Condyles* they would bruise them; and if the Part, which I say must be placed behind the internal *Condyle*, were before, it would bruise the Vessels.

Third Circumstance.

The Strap being fastened, one must place the Buttreffs (L) thrusting the Arm into the Button-hole as near the Shoulder as possible; so that one of the Sides of the Slit bears against

Of the Buttreffs.

the *Clavicle* and the *Acromion*; and the other against the under Rib of the *Omo-plata*. The two Ends (*kk*) must be turned one towards the *Sternum*, and the other towards the external Face of the *Omo-plata*.

I can't forbear correcting here a great Error in all the Methods before-mentioned, and all those laid down by Authors; 'tis this: that they have taken no Care to with-hold the *Omo-plata*, and the *Clavicles*. They have contented themselves with with-holding or thrusting back the Body, whilst they drew the Arm, which is not sufficient; since the Shoulder follows the Arm when it is drawn, and the Extension is fruitless. It has been demonstrated that one must remove the dislocated Bones at a Distance from each other, to put the Head even with its Cavity from whence it has issued, and into which one would have it return.

Remark. As it has been said in general that the Extensions and Counter-Extensions must be made upon those very Bones that are disjoined, and not upon those next to them, if any one has had Success in setting the Arm, without having the Precaution to with-hold the Shoulder, it has been at the Expence of the *Trapezius*, the little *Pectoral*, and *Rhomboides*, which have had Strength enough to keep back the *Omo-plata*; a Strength which they have not always, and to which one ought not to trust, it being dangerous to put it to the Test.

How one must place the Machine. When the Buttress is put on, the Ends of the Branches of the Machine must be placed in the two Sheaths which are at the Point (*kk*) of the Buttress. The String (*F*) must be run into the Loop of the Strap (*BB*) and one of its Knots must be fastened as it passes by in one of its Button-holes; then one claps on the Handle

dle (M) at the Linch-pin of the Axle-Tree, and Working begins the Operation, during which, what fol- of the lows must be observed, viz. That the lower Machine. End of the Machine rests upon the Ground; that if 'tis the left Arm, the right Hand to the Handle, and the left upon the Shoulder of the Patient.

This done, one turns the Handle, and the Cord of the *Moufles* winds round the Axle-Tree (K) which brings the moveable *Moufle* near the dormant one, and draws the Arm on the same Side, whilst the Shoulder is kept fixed; so that in Proportion as the Handle turns, one removes the Head of the *Humerus* from the unnatural Place wherein 'twas lodged, to bring it near the Cavity of the *Omop'ata* which is its natural Seat, wherein it sometimes places its self without any other Operation; and sometimes one must work with the Hands also to guide it thither, which must not be done till the Extension is found to be sufficient by the Way that the *Moufle* has took, and by the stretching of the Muscle *Deltoides*.

Time to reduce the Bone.

Signs that the Extension is made or making.

'Tis known that the Bone has placed it self, as it were of its own Accord, by the Noise it makes in re-entring, and by a roundness that is perceived at the *Acromion*, at the Place where there before appeared a Hollowness.

Signs that the Reduction is made.

To facilitate the Reduction of the Bone when luxated outwards, the lower End of the Machine must be turned outwards, that the Head of the Bone may throw it self in.

Means to reduce the Bone luxated outwards.

To facilitate the Reduction, when the Head is forwards under the *Pectoral*, the lower End of the Machine must be thrust forwards, to carry the Head of the Bone on the contrary Side.

For the Bone luxated inwards.

In fine, if the Arm-Bone is luxated downwards, one must pass both Hands between the Branches,

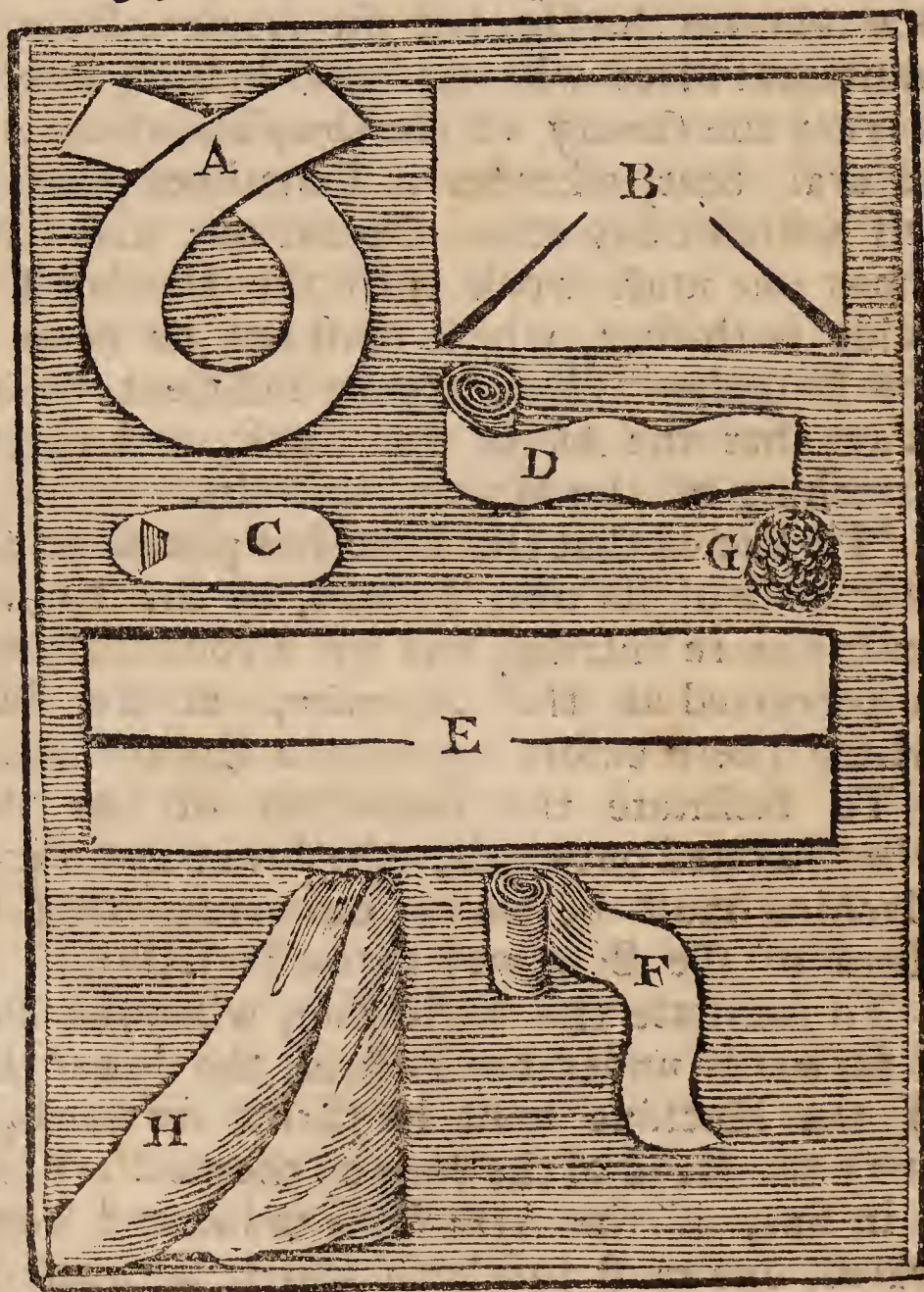
For the Bone luxated

down-
wards.

Branches, join them together under the Arm-pit, raise the Head of the *Humerus*, bow down the lower End of the Machine, and the Reduction is made.

What
must be
done af-
ter the
Reducti-
on.

After the Reduction, the String of the Machine that is put thro' the Loop of the Strap must be untied, having the Strap held by some Body who draws it by its Loop, and taking off the Machine and the Buttress. Then leaning the left Hand upon the *Acromion*, and the right under the Elbow, which one brings near the Patient's Body, one puts on the Dressings, viz.



The Compress (A) its middle under the Arm-pit, and its two cross Ends over the *Acromion*, to wrap round the Shoulders; then the Compress (B) which covers the whole again, and afterwards the Compress (C) which trims the bottom of the Arm-pit; the Roller (D) which makes the *Spica* round the Shoulder: One must afterwards lay on the Compress (E) which covers the Arm and the Elbow at the Place where the Strap was fastened. This Compress must be kept on by the Roller (F) which must make circular Casts round the Arm, and then a Figure of 8 passing from the Arm to the Fore-Arm, and back from the Fore-Arm to the Arm. One must put into the Hand the Pellet (G.) All these Dressings must be dipped in Brandy wherein Alum has been steeped.

Applica-
tion of
the Dress-
ings.

One must cover and support the Hand, Fore-Arm and Arm, with the Scarf (K) made with a fine Napkin, that must be at least two Thirds of an Ell long, and as much in Breadth. It must be folded from one Corner to the other in a Diagonal Line, which will give the Napkin the Figure of a Triangle. It being thus folded, must be put between the Arm and the Breast of the Patient, so that the right Angle may be under the Elbow, and the great Side of the Triangle under the Hand. Of the two acute Angles, one must be placed over the right Shoulder, and the other turning back again and covering the Fore-Arm, must go over the left Shoulder to meet that which went over the Right. They must be sew'd together to keep them at a proper Height, after this, take the two Angles of the Napkin, at that Part which is at the Elbow, and separate them, drawing the internal Angle backwards, so that the main Part of the Fore-Arm be almost at

The
Scarf.

The
Manner
of putting
it on.

the Center of the Napkin ; then one must fold again these two Angles, *viz.* the Angle that is before under the Hand, and that which is behind under the Arm, bringing them near, and fastening them to each other, and to the Body of the Scarf with a strong Pin.

Remark.

This Scarf is the most proper, because it wraps round the whole Limb from the Shoulder to the Fingers Ends, whereby no Risque is run of the Patient's acting imprudently, or disordering his Dressings, as happens but too frequently.

Remedies.

The Scarf ought to support well the Elbow, and keep the Fore-Arm bent almost in a right Angle, the Hand being of an equal Height with the Elbow.

Regimen.

The Patient must bleed once, twice, or thrice, according as is necessary : He must also observe a proper Dyet. As for the rest, you will perfect the Cure, by observing what has been said in General upon the Subject of Accidents and Symptoms that precede, attend, or follow the Reduction.

They who are Masters of what I have said of Luxations in General, and what has just been mentioned about that of the Arm, may be in a Condition to cure the others ; at least there will be but little wanting. These two Chapters include the whole Theory and Practice of Dislocations, for which Reason I have enlarged very much both upon the one and the other.

C H A P. VIII.

Of the LUXATION of the Fore-Arm from the Humerus.

T H E R E are two Bones in the Fore-Arm Structure which are jointed with the *Humerus*; this Junction is one of the most compact *Ginglymus*'s that can be, and the most difficult to luxate.

The *Cubitus* makes the greatest Part of the *Ginglymus*, it cannot move without the *Radius*, but the *Radius* moves without it in making the Pronation and Supination.

The Fore-Arm luxates before, behind and The on the Sides. I have never seen one dislocated Kinds forwards, and I believe such a Luxation very and Dif- difficult. If it does happen, the Arm must be ference. stretched out, because the *Biceps* and the *Brachialis internus* are relaxed, and the *Extensors* are stretched by the Distance of the *Olecranon* where they insert their *Aponeuroses*.

When it is dislocated forwards, the *anterior* Remark *Apophysis* of the *Cubitus* is lodged in the hinder and Cavity of the *Humerus*; and the Fore-Arm is Signs. a little bent, because of the Distance of the Insertion of the Muscles, which being greater in the *Extensors* when the Luxation is forwards, ought on the contrary to be greater in the *Flexors* when the Luxation is backwards.

When the Luxation behind is incompleat, Signs. the anterior Eminence of the *Cubitus* is at the Centre of the Kind of Pully made by the Arm-Bone. At that Time the *Musculi Flexores* are a little less extended, and the *Extensores* less relaxed,

laxed, than in the compleat Luxation behind ; and the Fore-Arm is a little less bent in the Compleat than the incompleat. The Pain is violent when one extends the Elbow, and the Patient finds Relief when one bends it.

Signs.

When 'tis compleat inwards, the Vessels suffer considerably ; and sometimes they are so torn, that it occasions *aneurismal* Tumours, or *Trombofes*, which one is often obliged to open and cause suppurate.

Signs.

When 'tis incompleat, the internal Semi-lunar Cavity of the *Cubitus*, receives the internal Eminence of the *Humerus* ; and as this Eminence is a little less raised than that which receives the external Cavity of the *Cubitus*, the Fore-Arm is turned a little outwards, the *Radius* is near the middle Eminence of the *Humerus*, the internal Part of the Arm is less raised than in the compleat Luxation, and the Vessels also are in Pain.

Signs.

When the Dislocation is compleat outwards, the Vessels are only a little stretched, but don't suffer so much as in the internal Luxation. There is a great Prominence outwards towards the Fore-Arm, and a considerable one inwards towards the Arm. The first is formed by the Presence of the two luxated Bones, and the second by the lower End of the *Humerus*.

Situation
of the
luxated
Bones.

The incompleat Luxation may happen two Ways ; the first is outwards, in which Case the *Radius* is entirely dislocated, and no longer receives the Eminence of the external *Condyle* ; the exterior Cavity of the *Cubitus* receives the external *Condyle*, and the inward Cavity of the *Cubitus* receives the Eminence that its outward Cavity did before receive.

Situation
of the
luxated

The second is inwards, the *Radius* no longer touches the external *Condyle* of the *Humerus*, it receives

receives the middle Eminence; and the inner Bones. Cavity of the *Cubitus* no longer touches the internal Eminence of the *Humerus*.

The Causes are amply particulariz'd in treating of Luxations in general, to which may be added that the Luxation forwards never happens, but thro' a violent overstraining on the Side of the Extension by a great Fall, or some other extraordinary Cause.

The Luxation behind is most commonly occasioned by a Strain on the Side of the Flexion. I say most commonly, because I have known one behind caused by a Strain on the Side of the Extension, in a Lady that was very fat, unweildy, and heavy, who fell in her Chamber upon her right Hand. The Fore-Arm was extended, and the Weight of her Body being greater than the Resistance of the Fore-Arm, forced it to bend on the Side of the Extension. The lower Part of the *Humerus* broke the *Biceps*, and the *Brachialis Internus*, whose Ends came out thro' the Skin; the *Humerus* issued out of the Wound, and rested upon the Floor: The *Olecranon* mounted up above four Fingers Breadth behind the *Humerus* under the Skin. The Extensions and the Reduction were made with Ease; the Part of the *Biceps* which issued thro' the Wound the Length of a Thumb, cou'd not be replaced; it was forced to be cut off. The Fore-Arm was bent, and the Lips of the Wound were in the Bending. This Position which was favourable to the Re-union, was not less so to the Luxation; both the one and the other were cured in six Weeks.

The Luxations on the Sides don't happen easily, because the Motion of the Articulation on neither favours the falling of the Bone inwards

inwards nor outwards. The Fall must be complicated, and besides the Fore-Arm must be in Extension at the Time of the Fall. Falls may be complicated several Ways; For Instance, I once saw a Luxation outwards in a Footman, who falling from a Coach that was overturned, had his Arm lock'd in the Spokes of the Wheel.

Observation. Another had his Elbow dislocated inwards by being thrown with his Horse, who fell upon his Arm in an uneven Place, whereupon the lower Part of the *Humerus* rested; and the Fore-Arm not being supported gave Way to the Weight of the Horse which thrust it inwards.

Remark. Therefore I believe that the Fall must be complicated to produce either inward or outward Luxations.

Remark. The Dislocations on the Sides are generally incompleat, because the Surface of the Bones is so considerable at the Place of their Jointings, that an entire Dislocation cou'd not happen without a total Rupture of the Ligaments, and sometimes of the Muscles.

The Cure. The Manner of reducing these Luxations is different, according to their Kinds; nevertheless both in the one and the other, one must make the Extension and Counter-Extension, and thrust the Bones into their Places.

Manner of reducing the Bone. If the *Olecranon* is in the Cavity of the *Cubitus*, the Surgeon to reduce this Luxation, puts his Elbow in the bending of the Arm; he joins the Palm of the Patient's Hand to the Back of his, and holds them both strongly with his other Hand; then he bends his Arm with all his Might, which makes the Extension and Counter-Extension at the same Time.

This

This Method is not the best. Authors have proposed a Bed-post, or something like it to make the Reduction thus. If 'tis a Bed-post, they set the Patient upon the Bed, with the dislocated Side near the Post, which the Surgeon places having first covered it with Linnen, in the Bend of the dislocated Arm: A Servant with his two Hands pushes the Elbow against the Bed-post, the Surgeon places himself on the sound Side, taking the Fore-Arm that is affected near the Wrist with his left Hand, and the Shoulder with his right Hand, if 'tis the right Arm that is to be reduced: On the contrary, he takes the Fore-Arm with his right Hand, and holds the top of the dislocated Arm with his left, if 'tis the left Arm that is to be reduced. Being thus placed, he brings forcibly his two Hands near each other, as if to bend the affected Arm, whilst his Servant thrusts against the Bed-post, and the Reduction is made.

Another
Operati
on.

This Method does not always succeed, and may be pernicious, because the Muscles are drawn before they are sufficiently relaxed. In Effect, the *Extensors*, which are considerably stretched by the Distance of the *Olecranon*, are yet more so when the Extension and Counter-Extension is made with the Bed-post. 'Tis better to follow the Rules that I have laid down in General, which ought to be yet more regularly observed when the *Apophysis Coronoides* of the *Cubitus* is found precisely upon the middle of the Pully of the Arm-Bone. This Luxation can never be reduced by bending the Fore-Arm, if the usual Extensions are not first made. When they are, one must bear with one Hand upon the bending of the Arm, and with the other take hold of the Fore-Arm near the Wrist,

Defect of
this Me-
thod.

Another Manner. Wrist, to make the Flexion at the Minute that the Extensions are judged sufficient: Or else, if you will, you may thrust the *Olecranon* forward from behind, which does almost the same Thing, but with less Force.

Another Way. When the *Apophysis Coronoides* is in the hinder Cavity of the *Humerus*, they make stronger Extensions, and they continue them till the *Olecranon* re-enters into its Place, then they bend the Fore-Arm, and the Reduction is made.

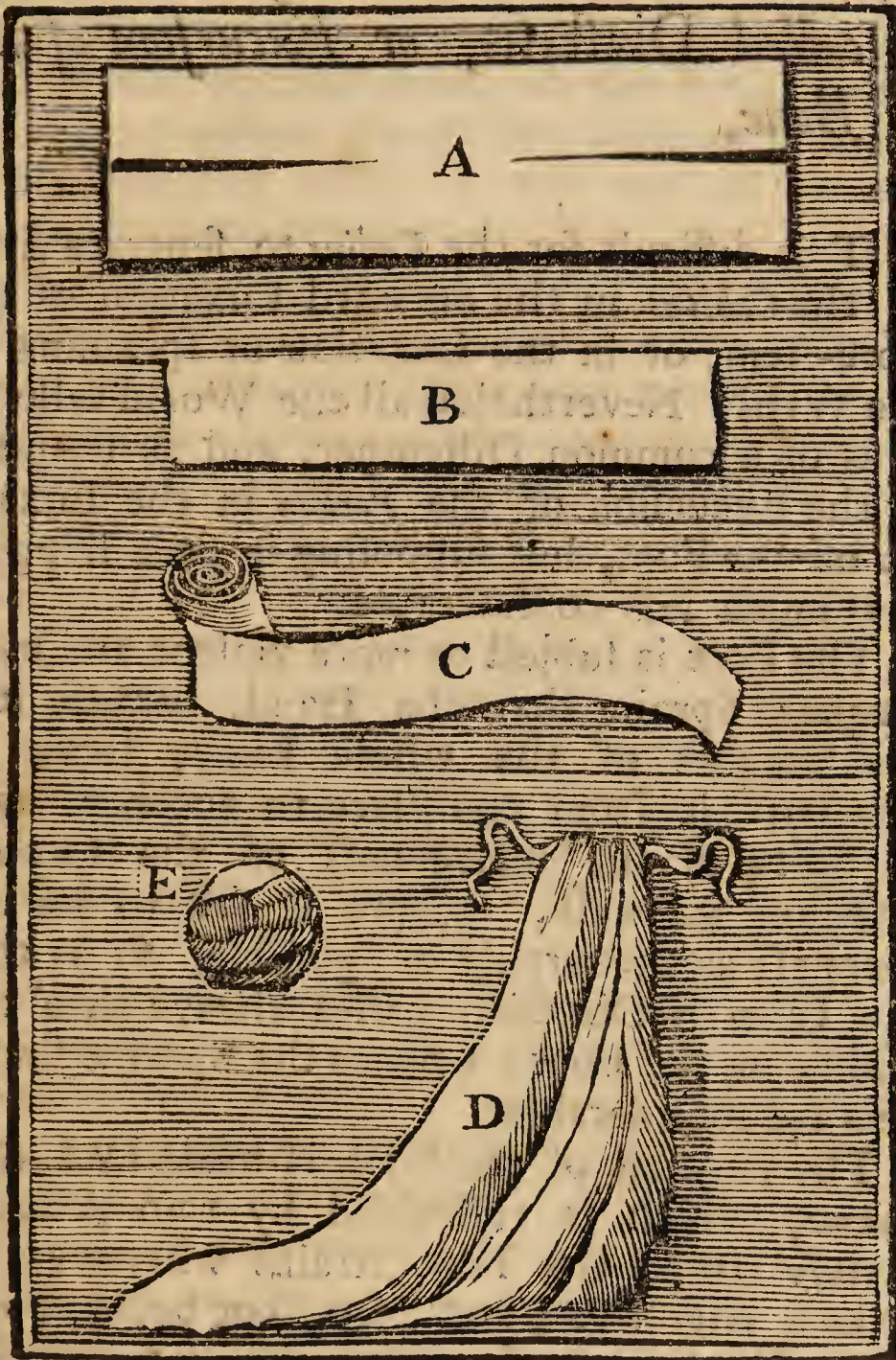
Another. When the Luxation is forwards, they also make strong Extensions, and they bend the Fore-Arm, when the Limb is sufficiently stretched.

Another. If the Luxation is outwards (whilst the Assistants are employed in making the Extensions and Counter-Extensions) you must lay your Hands, the one within, upon that Part of the Articulation that is formed by the *Humerus*, and the other without upon that Part that is formed by the *Radius* and the *Cubitus*, and bringing both Hands together, with a Jerk, the Reduction is made.

Another. When the Luxation is inwards, whilst the Extensions are making, one Hand must be laid on the inward Part of the Articulation formed by the Bones of the Fore-Arm, and the other without, on that Portion of the Articulation that is formed by the *Humerus*, and by bringing them forcibly near each other the Reduction is made.

Dressing. After the Reduction, one puts on all the Sorts of Luxations the Compresses marked (AB) in the Figure of the Page following; and they must be dipped in camphorated Brandy, if there is an *Ecchymosis* or *Trombosis*. This done, the Bandage *Spica* must be made with the Roller

Roller (C) and afterwards the Arm must be placed in the Scarf (D) with the Pellet (E) in the Hand.



C H A P. IX.

Of the LUXATION of the Radius
called *Diastasis*, or *Excursion* of the
Bone.

Whether
the *Di-*
stasis is an
easy *Di-*
stemper.

IT is difficult for the *Radius* to separate from the *Cubitus* in the outward Luxation of the Fore-Arm, or in the Luxation or spraining of the Wrist: Nevertheless all the World talks of it as of a common Distemper, and as frequent as the Excursion of the *Perona* in the Luxation of the Foot, but supposing it does happen, it is much less considerable.

Why the
Diastasis
is more
frequent
in the
Perona.

The Foot is subject to more violent and more frequent Sprains than the Hand, because it is the Support of the whole Body, serves to transport it from one Place to another, and, in Spite of the unevenness of the Ground whereon we walk, adapts it self to its unevenness as favourably as possible, so as that the Line of Direction passes always thro' the middle of the Foot; whence the Sprains that it gets are considerable.

Another
Reason.

The jointing of the Foot is made by a *Ginglymus*, which is restrained by two *Malleoli*, against which the Foot strains whenever we make a false Step; and they, not being of one single Piece, may separate: Which Separation is call'd *Diastasis*.

Diffe-
rence in
the
Wrist.

'Tis not the same in the Wrist, which is jointed by a *Genu*, and which can turn either in or out without straining contrary to the Bounds of its Articulation, which Bounds are much less raised than those of the Foot, and have

have less hold of the Head of the Bone, and the *Cubitus* belongs not (as one may say) to the Articulation, which renders the *Diastasis* yet more difficult; for to cause a *Diastasis*, the Eminence of one of the Bones of the Fore-Arm must be the Point that supports the Head of the Bones of the Wrist, at the Time that it makes an Effort against the Eminence of the other, without which it will not act so as to make the Separation.

One may add that the *Musculus Quadrator Rotundus* opposes this Separation; and besides the inter-ossal Ligament helps very much to retain the Bones, both in the one and the other Part. Continuation.

All these Reflections made upon the Structure of the Part, not only prove that the *Diastasis* seldom happens to the Wrist, but they persuade me that 'tis imaginary, and that ordinary Strains cannot cause it.

There are Surgeons who pretend to have seen it. I won't dispute against Matters of Fact, but I may be permitted to doubt of those I have not seen; not that I will accuse those of Imposition who say they have cured the *Diastasis* of the *Radius*, but they may be mistaken. They say that it has been seen.

I don't say that the *Diastasis* is absolutely impossible, if the Cause be complicated; for it may happen that a Fall or Blow may have a Combination of so many Circumstances, that the Strain may have a Tendency to retain the *Cubitus* in its Place, and at the same Time, and with the same Violence, may force the *Radius* from its right Position; but it will never happen in an ordinary Strain, Blow or Fall. How it is possible.

I have been carried to see Patients, who they said had the *Diastasis*; there was indeed a great Relaxation in the Joint of the Wrist, which allowed the *Radius* a Motion, that is not common. Observations.

mon to it: I was sensible of a Noise of a glearous Matter, but found no Separation. These Patients had had Sprains or Luxations of the Wrist, which had been succeeded by a Tumour of the Joint, either by the Swelling of the Parts next the Articulation, or by the Increase of the *Sinovia* which had relaxed the Ligaments, and permitted the Separation of the Bones.

This Disease has no other Dressing than that of the Luxation of the Wrist, which will be found in the subsequent Chapter.

C H A P. X.

Of the LUXATION of the Wrist.

Structure

THE Wrist is joined by a *Genu* with the two Bones of the Fore-Arm. This Articulation is one of the most curious that is to be seen in a human Body. The 2d, 3d and 4th Bone of the *Carpus* or Wrist, form a round and oblong Head, covered with a polished Cartilage, which is jointed in a pretty superficial Cavity formed by the *Radius*. The *Cubitus* has no Share in this Articulation, altho' it seems to have, because the Cartilage that is over the Cavity of the *Radius* is prolonged, and makes an Appendage which covers the End of the *Cubitus*, and places it self between the Bones of the *Carpus*, and the lower Extremity of the *Cubitus*. This Appendage is hollow on the Side of the Wrist Bones, and is (as one may say) a Prolongation of the Cavity of the *Radius*; with-

without it, this Cavity would not be sufficient to lodge the Head of the Wrist-Bones.

The Side of the cartilaginous Appendage that is next the *Cubitus*, is also hollow, to lodge the the lower End of the *Cubitus*.

Several Ligaments fasten this cartilaginous Appendage to the *Cubitus*, and the Wrist-Bones: One of them, which fasten it to the *Cubitus*, makes a Sort of Ring, which gives Liberty for the Motion of Pronation and Supination. The Ligaments.

The Flexion and Extension of the Hand are more apparent Motions, than those which are made Sideways, because the second Row of Bones of the *Carpus* has a particular Articulation with the first; the latter form a Cavity; the former a Head which is jointed therein, and moves very sensibly; so that the Flexion is made in two Places, viz. at the Junction of the first Row of the Wrist with the *Radius*, and at the Junction of the second Row with the first. This Junction is, as well as the other, fastened by several very strong Ligaments, which have different Directions, without diminishing the Facility of the Muscles in moving. Movements.

The Muscles that belong to the various Movements of this Articulation terminate in tendinous Strings, and pass over the Articulation to the Wrist-Bones, where they insert themselves without being fixed to any Thing whatever, any more than a Cord that passes thro' a Pulley; they are covered with Sheaths, wherein they slip without suffering any Friction, because a Liquor like the *Sinovia* of the Articulations, moistens and lubricates these Sheaths, and the Tendons. Muscles.

In almost all other Articulations the fleshy Part of the Muscles passes over the Joint; but in the Wrist and the Foot, there are only Remark.

tendinous Strings. What is very essential to remark, is, that not only the Muscles which belong to the Movement of the Wrist, pass over this Articulation, but also the proper, as well as the common, *Flexors* and *Extensors* of the Fingers.

Kinds.

The Wrist may luxate forwards and backwards, that is to say, on the Side to which it bends, and on the Side of its Extension. It also dislocates on the Inside, and on the Outside; that is to say, towards the Thumb, and towards the little Finger.

Remark.

The Luxations before and behind are the most common, for I believe the others very rare, at least they are more difficult, because the Eminences of the *Cubitus* and *Radius*, which serve as Limits, or (if I may venture to say so) as *Malleoli*, or Ankles, as in the Articulation of the Foot) are so narrow and so pointed, that when the Wrist is forced outwards, it cannot rest upon them, and is obliged to slip forwards or backwards; in like Manner if it is carried inwards, it will be obliged to slip before or behind, the pointed Eminence of the *Cubitus* inclines it to fall so.

Remark.

In all Falls the Palm of the Hand seems to go before us, as it were to defend us from its ill Effects: In this Case if the Hand luxates, it turns to the Side of the Extension, and the Head of the Wrist-Bones falls on the Side of the Flexion.

Remark.

When one falls on the back of the Hand, and the Wrist dislocates, the Hand remains turned on the Side of the Flexion, because the Head of the Wrist-Bones falls on the Side of the Extension; so that 'tis uncommon in Luxations of the Wrist for the Hand to be turned towards the Thumb, or the little Finger.

When

When the Wrist is dislocated inwards, I mean Signs.
towards the Thumb, one finds an Eminence towards the *Radius*, the Hand is turned outwards towards the *Cubitus*, the Fingers can neither bend nor extend themselves without great Pain, which is caused by the *Flexors* and the *Extensors* being equally stretched, being alike distant from their Origin. The Hand is turned outwards, because the *Cubitæus internus* and *externus* are extended.

The Patient is in Pain when his Wrist is Signs.
turned outwards, and he is relieved if his Hand is brought near the *Cubitus*; because it eases the Muscles whereof we have been speaking, by putting them in a more tolerable Degree of Tension.

The Pronation and Supination are made with Signs.
Pain, because it is impossible to make those Movements without the Hands following, which gives it Shocks that irritate the Muscles and Ligaments which are in a great Tension.

The Pain which the Patient suffers is always Signs.
felt the whole Length of the *Cubitus* to the internal *Condyle* of the *Humerus*; because the *Cubitæus internus* & *externus*, which are stretched in this Luxation, are fastened all along the *Cubitus*, from the *Condylus internus* to the Wrist.

When the Luxation is outwards, I mean to- Signs.
wards the little Finger, the End of the Hand is turned towards the Thumb, and the Head of the Wrist-Bones faces the little Finger; which is caused by the *Radius internus*, the *longus* & *brevis* which are in Contraction.

The Fingers can neither bend nor extend themselves without Pain, by Reason of the Tension both of the *Musculi Flexores* & *Extensores*.

Signs.

The Patient is in Pain when his Hand is turned towards his Thumb, because it extends the Muscles already stretched; and he finds Relief when one turns it towards the little Finger, because it relaxes those very Muscles.

In Pronation and Supination (as in all the other Motions which put the Patient to Pain) the Anguish is always felt from the Wrist to the external *Condyle*; for 'tis in this Compass that the *Radial externi*, the *longus & brevis* (which are called together *Radius externus*, or *Bicornis*) are lodged and have their Rise. This Pain is also felt in the Fore-part of the *Condylus internus*, because the *Radius internus* which takes its Origin there, is extended like the others.

Signs.

If the Wrist is luxated on the Side of the Extension, there will be an Eminence on the Side of the Flexion, and a Cavity on the other. The Eminence proceeds from the Head's being forced thither, whence a Hollowness is found at the Place from whence it has issued.

Explication.

The Wrist is forced on the Side of the Flexion, and the End of the Hand on that of the Extension, because the *Extensors*, which are stretched, draw on that Side.

Explication.

The Fingers are bent, and can't be extended, because the Head of the Wrist-Bones thrusts the Tendons of the *Sublimis* and the *Profundus* inwards; which considerably removes their Origin from their Insertion.

It causes great Anguish when one bends the Wrist, because it stretches the *Extensors* which are in a considerable Tension.

Sequel.

The Pronation and Supination are yet more difficult and painful than in the foregoing Luxation, because the Head of the Wrist-Bones
are

are precisely in the Place where the Movement of the *Radius* with the *Cubitus* is made.

The Pain is felt all over the Fore-Arm to Sequel. the two *Condyles*, because the Muscles that are stretched on both Sides, have their Fastenings at the two *Condyles* of the *Humerus*.

The Signs that the Luxation of the Wrist is Signs. on the Side of the Flexion, are, that there is an Eminence on the Side of the Extension, and a Hollowness on that of the Flexion; tho' the one and the other are less apparent than in the Luxation aforegoing.

The Wrist is forced on the Side of the Ex- Explica-
tension, and the Hand is turned on the Side of tion.
the Flexion, because the *Flexors* of the Wrist are more stretched than the *Extensors*.

The Fingers are extended, and one can't Sequel.
bend them without Pain, because the Head of the dislocated Bones thrusts and presses the Tendons of the common and four proper *Extensors*.

It puts the Patient in great Pain to extend the Sequel.
Wrist, because the *Radius & Cubitus internus* which are in a great Tension, are yet more violently stretched when one would extend the Wrist. There is the same Difficulty of Pronation and Supination, as in the preceding Luxations.

The Pain extends all over the Fore-Arm to Sequel.
the external and internal *Condyle*, because the Muscles that are stretched are on both Sides the Fore-Arm, and are fastened to the two *Condyles*.

Of the Prognostick and Accidents that attend, or may follow these Luxations.

The Luxation of the Wrist is one of the most Prognostick.
Melancholy, both by Reason of its extraordi-
nary

nary Pain, the Difficulty of reducing it, the Inflammation that follows it, the Swelling of the Part by the Inflammation, the Defluxion and Imposthumes of glearous Matter, and lastly, because it is long in curing, and there often remains a periodical Pain, a Difficulty of moving it, and sometimes an *Anchilosis*, on Account of the Glears that diffuse themselves and coagulate in the Articulation, in the Sheaths of the Tendons, and other neighbouring Parts.

Explication.

It is easy to explain all these melancholy Accidents, when one reflects on what we have said of the Structure at the Beginning of the Chapter, and in the Account of Luxations in general.

Explanation.

Every Time there happens to be a Sprain or Luxation in the Wrist, there does not only happen a displacing of the Bones, but also every Tendon is, as it were, displaced; their Sheaths being removed, and extraordinarily stretched, and the Spring of the *Sinovia* compressed; this Liquor flows into the Sheath, and removes it yet more, it compresses the Tendons, and they can't slip into their Sheaths to make their Movements, or if they do, 'tis with Difficulty, and acute Pains; caused not only by the Tension which this Matter occasions in the Sheath, but also by the Compression that the Matter and Resistance of the Sheath causes in the Tendons.

In the End this Matter coagulates or is corrupted, either by its own ill Quality, by the Fault of the Patient, or that of the Surgeon.

Observation.

If the *Sinovia* coagulates, it renders the Joint stiff, and sometimes produces an *Anchilosis*; and if 'tis corrupted, it causes Abscesses that are very hard to cure, and very often terminate in

Fistula

Fistula's with a *Caries* and Putrefactions, which generally end in Amputation.

These Accidents may also come thro' the Fault of the Patient, who observes no Regimen; and they happen thro' that of the Surgeon, if he applies oily Medicines that cause an Inflammation, or too spirituous ones which coagulate the *Sinovia*; or, in short, by having neglected Bleeding.

I can't forbear taking Notice here of a Fault ^{Reflections.} into which they fall, who have not practised much; they believe that they must not bleed if the Fever, the Pain, or Inflammation don't induce them to it; but they don't reflect that when the Reduction is made, the Pain may cease without the first Causes of the Inflammation, the Fever, or the Return of the Pain's being removed; forasmuch as, in the Luxation we are treating of, the Sheaths and Tendons themselves have suffered more in Proportion than the rest of the Articulation, the *Sinovia* has diffused it self over the Sheaths of the Tendons in great Quantity; and the Glands, which serve to absorb the Liquor, have no longer Power to suck it back, on Account of their swelling; and therefore, tho' there be no more Pain, one must bleed, to empty the Blood Vessels that feed the Parts of these Joints, and thereby cause the Arteries (by their not being so full) to furnish *Sinovia*, and enable the Veins, by being evacuated, to receive with more ease the *Sinovia* of the lymphatick Vessels, to the clearing of which their fullness is an Impediment. ^{Reasons for bleeding.}

After what has been said, we ought to reflect ^{Reflections.} upon two Things. First, that only Tendons ^{on.} pass over the Joint; and Secondly, that not only those which belong to the Movement of

the Hand, pass thereby, but also those which move the Fingers; so that these Dislocations must be more dangerous.

There is not here as in the Arm, a *Deltoides* and a *Pectoral*, nor as in the Thigh, *Gluteus's* and *Triceps's*, whose fleshy Bodies, which are immediately at the Place of their Junction, resist more and with much less Pain, than all the Tendons of the Hand, since the Flesh of the Muscles is infinitely less sensible than the Texture of the Tendons. I will add some Aphorisms to finish the Prognostick.

First Aphorism. The Wrist is easily reduced when the Luxation is incompleat, and the Dis-jointing is between the first Row and the *Ra-
dius*.

Observa-
tion.

Second Aphorism. There are Luxations of the Wrist, which can never be set, when the Articulation of the first Row has dislocated from the second. It is hard to make the Reduction, because to succeed, the Effort must be made upon the Bones that are luxated, and not upon those next to them. Now the first Row has not Compass enough to be taken hold of, and grasped by the Hands that make the Counter-Extension; one is obliged to pull the lower End of the Bones of the Fore-Arm, whence one Part of the Strength is lost on the Articulation of the first Row with the *Radius*; the Remainder has not Power enough to separate the second Row from the first, to disengage the Bones and replace them.

Third Aphorism. Altho' the Reduction be well made, there remains a long Time a Difficulty in moving the Wrist and the Fingers; the Redundance of the *Sinovia* has (as one may say) drowned all the Places where it did good Offices by its unctuous Quality, and its due
Quan-

Quantity ; and it requires a considerable Time before this Liquor re-enters within its Bounds, or the Places overflowed are dried up ; at the End of which, the Movements are yet difficult, and the Tendons don't slip in their Sheath but with a great deal of Trouble.

Fourth Aphorism. The Pronation and Supination are difficult, and made with Pain. The *Radius*, which makes by it self the Junction with the Wrist, ought, one would think, to move over the *Cubitus*, and carry the Hand without Pain from Pronation to Supination, and from Supination to Pronation : But (as has been said) the Cartilage, that covers the Cavity of the *Cubitus*, makes an Appendage, which extending it self between the *Cubitus* and the Bones of the Wrist, finishes the Cavity that contains the Head of the Bones of the first Row, and forms also the Socket that lodges the Eminence of the *Cubitus*, over which the *Radius* rolls in Pronation and Supination. Now this Cartilage, and the Ligaments which serve it as fastenings, are swelled and in Pain, whence the Movements of the *Radius* over the *Cubitus* for Pronation and Supination, can't be made without Anguish.

Fifth Aphorism. Altho' the Wrist may be well set, there will appear a long Time after its Cure a Deformity at the *Cubitus*, and an Elevation of its Eminence near the Wrist, which makes the Patient, and ignorant Persons believe, that the Reduction has not been well made. The Bone-Setters take Advantage of this false Idea of the Patients, to make themselves esteemed, some saying that there is a Fracture, others cry a *Diastasis*, and some pretend that the Bones are disjoined, and set themselves about curing them by fraudulent Ope-

Knavery
of Bone-
Setters.

Operations, to which the credulous People fall a Victim, and are the Bubbles; but let them know that this deformed and apparent Blemish is the natural Consequence of their Disease.

Remark.

The deformed Swelling or Tumour that appears, is only the œdematous swelling of the Fat that covers the *Musculus Quadratus* as far as its Origin at the *Cubitus* under the Passage of the *Cubiteus internus*; and the Eminence of the *Cubitus*, near the Wrist, is nothing but the natural Eminence of that Bone which appears more raised, both because it is thrust a little outwards by the *Sinovia* of its Articulation with the *Radius*, and by the Swelling of ligamentous Covers that wrap round it.

Of the Cure.

To make
the Re-
duction.

The Extensions and Counter-Extensions seem easy, because there is hold enough on the Hand Side to make the one, and towards the Fore-Arm for the other. One must place some strong Person towards the Fore-Arm, who must grasp it with both Hands 3 or 4 Fingers Breadth from the Joint: Another yet stronger must take hold of the *Metacarpus* as near the *Carpus* as possible. The Surgeon must make them pull at first softly, then increase by Degrees till the Extension is sufficient, then the Wrist will sometimes reduce of it self, without one's being obliged to do any Thing else: At other Times it is requisite to direct the Person who pulls the Hand, how to move, and to work ones self to guide the Head into its Socket, so that if the Bone is luxated on the Side of the Flexion, the Person who pulls the Hand must be ordered to thrust it on the Side of the Flexion, whilst the Surgeon favours this Motion

on with both Hands, by inclining the Wrist to throw it self on the Side of the Extension.

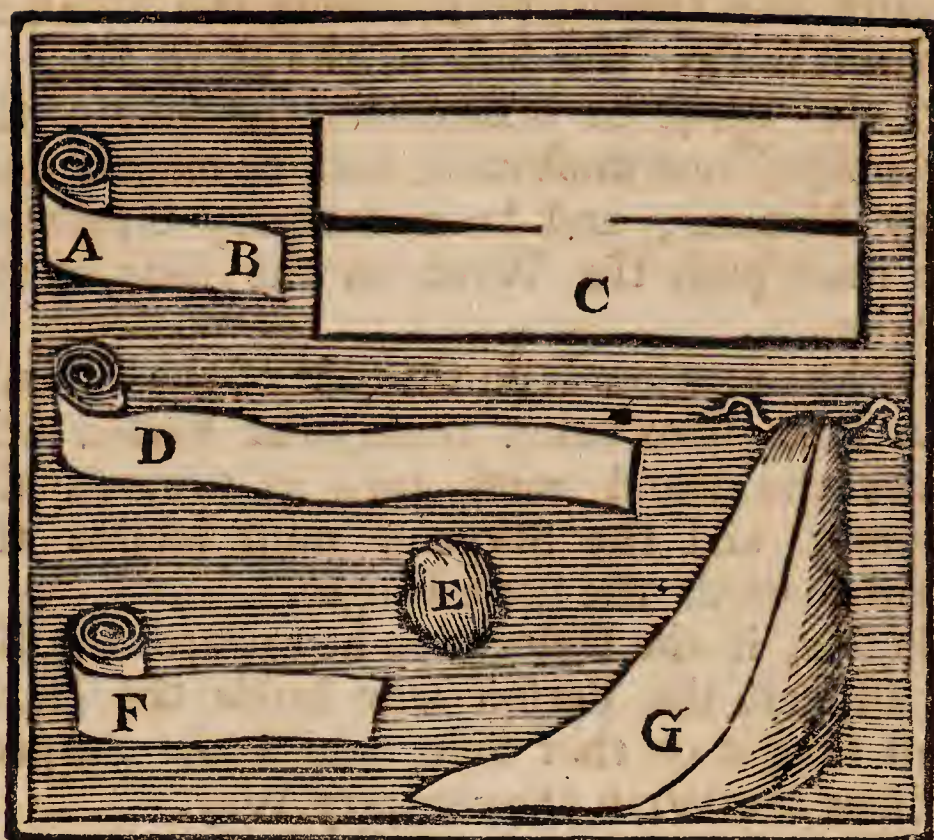
If the Wrist be luxated on the Side of the Extension, one must cause him to make a contrary Motion; and by a contrary Operation one must push the Wrist on the Side of the Flexion.

If the Luxation is on the Side of the Thumb, (the Extensions being made) the Person who draws the Hand must turn it towards the Thumb, and the Surgeon must incline the Wrist towards the little Finger.

In fine, if the Dislocation be towards the little Finger, the Person who holds the Hand, must turn it on that Side, whilst the Surgeon inclines the Wrist the contrary Way.

Dressings.

The Compress (A) must be laid upon the Articulation, taking up the lower Part of the Fore-Arm, and a great Share of the upper Part of the Hand. In beginning to put it on, the Thumb must be thrust into its Hole (B) then one must draw the Compress round the Wrist, lay over it the Bolster (C) and apply thereupon the Roller (D) two Ells and a half long, and two Fingers broad; it must make a Figure of 8, whereof the Crossing in *Spica* must always be where the Bone was whilst displaced; viz. on the Side of the Extension, of the Flexion, of the Abduction or Adduction, which are the four different Sides whereon the Wrist can luxate: The rest of this Roller must be rolled in Circles, some above the Articulation, and others beneath.



One must fill the Palm of the Hand with the Pellet (E) made of Linnen pretty large and soft, it must be kept on by a Compress, as the whole must be by the Roller (F) of an Ell and a half long, and two large Fingers broad. All the Compresses, Rollers and Pellets must be dipt in good aromatick or camphorated Brandy.

The Arm must be put in the Scarf (G) as it has been described in the Luxation of the Arm.

The Regimen, Bleedings, and general Remedies must be observed, as has been mentioned in other Luxations.

C H A P. XI.

Of the LUXATION of the Thumb
and other Fingers.

THE Fingers have their first *Phalanx* articulated with the Bones of the *Metacarpus* by a *Genou*, the other *Phalanges* are jointed by a *Ginglymus*. The first *Phalanx* of the Thumb is jointed by a *Genou* with the fifth Bone of the *Carpus*, it is jointed by a like Articulation with the second *Phalanx*, which is jointed by a *Ginglymus* with the last. 'Tis known that all these Jointings are moved by the Tendons of the *Sublimis* and the *Profundus*, by the proper *Flexor* of the Thumb, by the *Lumbricales*, and by the *Extensors* both proper and common; to which must be added the *Interossei*, the *Thenar*, the *Antithenar*, the *Hipponar*, the *Antihipponar*, and the *Adductor Indicis*. 'Tis remarkable that only Tendons pass over those *Phalanges* that are jointed by *Ginglymus*, and that over those that are jointed by *Genoux*, there pass musculous Bodies: The latter are the first of each of the four Fingers, as well as the first and second of the Thumb; they are much more susceptible of Luxation than the others, for Reasons that I have laid down in general.

The Thumb, as well as the other Fingers, may luxate on the Side of the Flexion, and of the Extension, inwards and outwards. The Dislocation is easier made on the Side of the Flexion than of the Extension: The two lateral Luxations are yet more difficult. When the first *Phalanx* of the Thumb is dislocated on the

Side of the Flexion, the Thumb is stretched out, and the Tendons that extend it fall outwards.

Signs.

When the Luxation is on the Side of the Extension, it is bent, and there appears an Eminence outwards, and its Extremity turns towards the Body when it is outwards, and on the contrary it inclines towards the other Fingers, when this *Phalanx* is dislocated inwards, that is towards the Body.

Signs.

The 2d *Phalanx* when luxated, gives almost the same Signs; but as its Articulation is less cover'd with Muscles, it is easily known by the Touch, and no Body can be mistaken therein.

Signs.

The Dislocation of the first *Phalanges* of the other Fingers is almost like that of the 2d of the Thumb.

The Luxations of the *Phalanges* jointed by *Ginglymus*, are so easily known at Sight, and by the Touch, that I need not give any Sign to judge of them.

Causes.

The Causes are Falls, Blows, and Strains, or the Fingers being taken or lock'd in any Thing.

Prognostick.

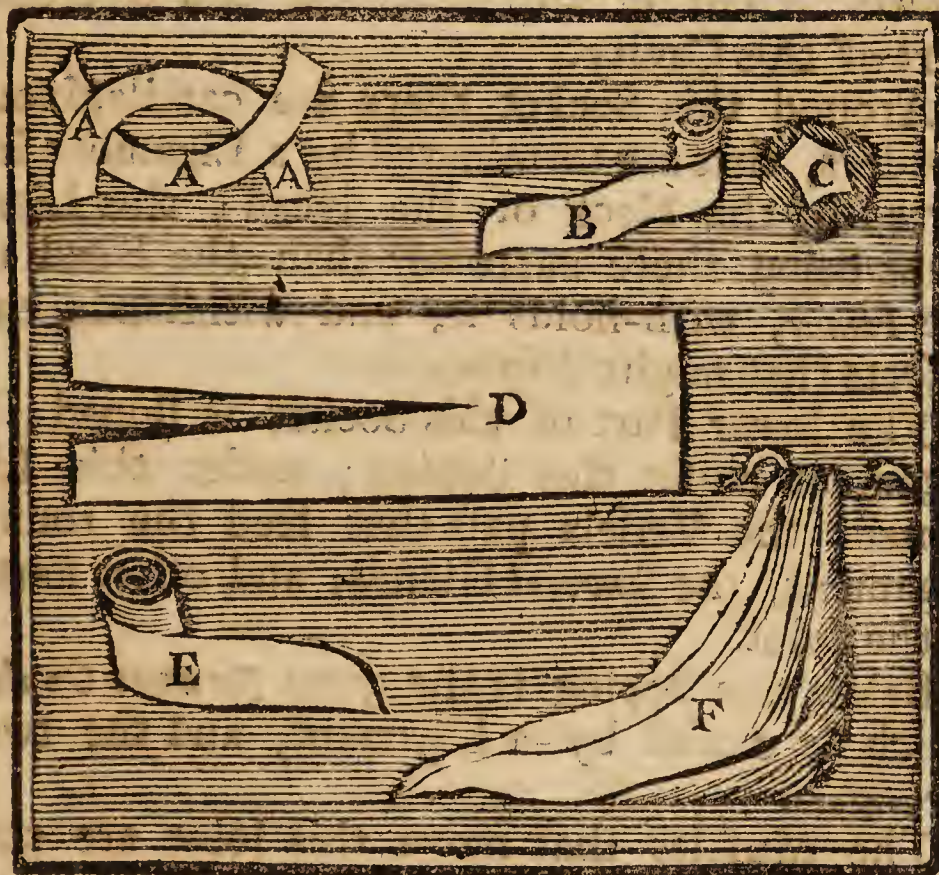
Prognostick.

The first *Phalanges* are more easily dislocated and set than the others; the first *Phalanx* of the Thumb has nevertheless some Difficulty, as being hid by the *Thenar*, *Antithenar*, and the *Adductor Indicis*, and what is more, one cannot easily make the Extensions. The last *Phalanges* being luxated are hard to replace, because one has no hold of them, they are so short that one cannot without Difficulty keep ones Grasp. I would not advise the putting in Practice what was said in publick by a Man who always proposes Methods suitable to his Rusticity. "To

make

“ make the Extension in these Cases, I make
 “ no Difficulty (says he) of taking hold of the
 “ luxated *Phalanx* with a pair of Pincers, and I
 “ pull it strongly till 'tis replaced.” Such an
 Author sometimes deserves richly to have his
 Fingers Ends pinched.

When the Luxation is reduced, there must
 be laid on two little cross Compresses (AAA)
 steep in Brandy, then a Bandage must be made
 with the Roller (B) viz. a *Spica* for the Luxati-
 on of the *Phalanges* of the Thumb, or for the
 first *Phalanges* of the other Fingers; and for the
 others a circular one. One must put into the
 Hand the Pellet (C) whereupon the Fingers
 must be placed in a middling Flexion: The
 Hand must be again covered and wrapt in the
 Compress (D) and the Roller (E) then the
 Scarf (F) must be made as usual. The Cure is
 continued as in other Luxations.



C H A P. XII.

Of the L U X A T I O N of the Thigh.

Structure

THE Articulation of the Thigh-Bone with those of the Hips, is by a *Genou*. The Head of the *Femur* is very large and smooth, and polished, on Account of the Cartilage that covers it; the Cavity of the *Ischium* is deep, and also covered with a Cartilage which polishes it like the Head that it receives; at least both the one and the other have this Smoothness at the Places of their Friction, which is all over, except the Fastenings of the round Ligament, which takes its Origin from this Head, a little lower than the Center, and inserts it self in the excentral and inferiour Part of this Cavity.

Around this Socket there are cartilaginous Borders, that are terminated by a Ligament inserted in the Neck of the Head; this Ligament being there narrower than the Head of the *Femur*, with-holds it, and withstands the Efforts that might displace it.

The lower Part of this Socket is sloped; a Ligament closes this sloping; under this Ligament the Vessels pass that feed the round Ligament, the *Sinovial* Glands, and other Parts of the Joint.

Below this sloping is the great *Foramen Ovale*, which is closed by a Ligament, and the two *Obturator*s.

Structure

The Muscles that move this Joint are the strongest that are, especially the *Glutai* that carry the Thigh behind and before.

The

The *Triceps* that draws it inwards is pretty considerable ; and if the *Psoas*, the *Iliacus*, and *Pectineus* have not so much Force in Appearance ; their Situation, and their Passage over the *Os Pubis* is a Help to their Action, and makes them bend the Thigh with a great deal of Vigour.

The Arch of the Muscles of the *Abdomen* gives Passage to them with the Blood, the nervous, and lymphatick Vessels, which go to make what is called the String of the crural Vessels.

The *Musculus Quadratus*, the *Pyramiformis*, the *Obturator*, and the two *Gemini*, have also great Force by their advantageous Situation, and because they are short ; these last five form an *Aponeurosis*, which is inserted in the Cavity of the great *Trochanter*.

Of all the Jointings by *Genou*, that of the Thigh is the most difficult to luxate.

The Thigh hard to luxate.

1. Because the Head of the *Femur* is very large, and the Cavity of the *Ischium* is very deep ; wherefore the Strain that forces it from its Place must be very violent.

2. There is no Part where the Muscles are stronger, and more numerous than here ; and because the Muscles serve to keep the Bones in their Places, as has been often said, there requires a greater Force to dislocate this Bone, than those where the Muscles are weaker.

3. There is a cartilaginous Border that adds to the Hollow of the Cavity, and this Border is form'd in such a Manner, that the Side which is most strait is against that Part of the Head that is straitest, which is that which faces the Neck ; the broadest is on the Side of the Cavity, and thus it encloses it below the Axis of the Head. It is easy to conceive that by this Mechanism, the Thigh that is firm in its Joint is extraordinary hard to luxate.

L

4. There

4. There is a round Ligament which opposes the Luxation: This takes its Rise from the Head of the *Femur*, and inserts it self in the Cavity of the *Ischion*; it is not, indeed, fasten'd directly in the Center of the Cavity, nor in the middle of the Head, whence it cannot resist against all Sorts of Luxations, as shall be shown in treating of their different Kinds.

5. Altho' there are very strong and many Muscles, it has not so free a Motion as the Arm; and we have said that the Joints, whose Motions were greatest and most apparent, dislocated with more Ease than the others, because their Articulations are less compleat. These are the Reasons why the Thigh is more difficult to luxate than the other Joints.

Of the Kinds and Difference.

Easiest

Luxation.

The Thigh dislocates upwards and inwards, upwards and outwards, downwards and inwards, downwards and outwards.

The Luxation downwards and inwards is most easy.

1. Because the Cavity of the *Ischion* is not so deep on that Side, as on all the others.

2. There is a sloping that is only closed by one Ligament, which leaves (as one may say) a Breach that facilitates the issuing out of the Thigh-Bone on the Side of the *Foramen Ovale*.

3. The round Ligament that retains the Head of the Bone, is nearest the internal Side of the Cavity, whence the Head may remove farther on that Side than any other, without the Opposition of this Ligament.

4. The strongest Muscles are situated outwards, and upwards, so that the weakest are on the lower and inner Side, whence the Thigh Bone

Bone has fewer Impediments to conquer on that Side, than any where else.

The Luxations upwards are more difficult: A more difficult Luxation.
First, because the Head of the Bone (on Account of the Obliquity of the Cavity that receives it, and of the Neck that supports it) can more easily resist the Strains that thrust the Bone on that Side.

2. It luxates more difficultly upwards and outwards, on Account of the Height of the Border of the Cavity, which is an almost invincible Obstacle.

4. The *Gluteus major, medius & minimus*, are the strong Muscles that oppose this Luxation, and do with Respect to this Luxation what the *Deltoides* does in Regard to that of the Arm.

The Luxation downwards and backwards is the most difficult of all, because the Muscles always have a Tendency to draw the Thigh upwards and outwards; and besides the Border of the Cavity has no Breach on that Side, as it has inwards: I even believe that all the Luxations downwards happen downwards and inwards; the Bone placing it self on the *Foramen Ovale*, it is impossible, I think, that the Head of the *Femur* should rest upon the *Os Ischion*. The most difficult Luxation.

There are a great Many who believe that all the Luxations happen thro' the sloping, and that the Fall, being complicated or followed by some extraordinary Motion, inclines the Head of the Bone to take one of the other Positions.

Signs.

The Signs of the Luxation upwards and inwards, are.

1. That the Thigh is shorter.

L 2.

2. That

2. That the great *Trochanter* is raised higher, and the Buttock sinks in.
3. The Knee, the Leg, and the Foot turn a little outwards.
4. The Thigh is a little stretched.
5. The Thigh can't bend without great Pain.
6. There is a great Tumour on the *Os Pubis*.
7. The *Scrotum* swells.
8. The whole Thigh is choaked up, and benumm'd, and some Authors say that there follows a Stoppage of Urine.

Explication.

- First and
ed Ex-
plication. The Thigh is shorter, because it is mounted upwards, and the great *Trochanter* is raised on the same Account.
- Third. The Knee and Foot are turned a little out, because the *Obturator*s are stretched.
- Fourth. The Thigh is a little extended, because the Muscles are in Contraction, and the *Psoas*, *Iliacus* and *Pectineus* are relaxed.
- Fifth. The Thigh can't bend without great Pain, because the *Glutai* are too much stretch'd; and also because of the Head of the *Femur*'s compressing the crural Vessels.
- Sixth. The Tumour over the *Os Pubis* is made by the Head of the Bone which is over it.
- Seventh. The *Scrotum* swells, by Reason of the Compression of the Spermatick Vessels.
- Eighth. The Thigh Swells and is benumm'd by the Compression of the crural Veins, Arteries and Nerves.

The Signs that the Luxation is upwards, and outwards, are :

1. That the Thigh is shorter.
2. There is a Swelling outwards.
3. The Thigh, Knee and Foot are turned inwards.
4. The Thigh may be moved inwards, but not outwards without great Pain.
5. The End of the Foot rests upon the Ground.
6. The bending of the Buttock is higher.
7. The internal Muscles are stretched, as if there were a Cord from the *Pubis* to the middle of the Thigh.

Signs.

Explication.

1. The Thigh is shorter, because the Bone is gone upwards.
2. The Tumour or Bunch outwards is caused by the disjointed Bone.
3. The Thigh, Knee and Foot turn inwards, because the *Glutei* are relaxed, and the *Triceps's* are contracted.
4. The Thigh may be moved inwards, but not outwards without Pain, because the *Triceps's* are too stretch'd.
5. The End of the Foot rests upon the Ground, because the Thigh being shortened, the Patient to supply the Defect, endeavours to render it longer by extending the Foot.
6. The bending of the Buttock is higher, because the Thigh is mounted up.
7. The Cord that is felt from the *Pubis* to the middle Part of the Thigh, proceeds from the *Triceps's* being in a great Tension.

Explanation.

The Signs that the Luxation is downwards and internal, are.

Signs.

1. That the Head of the *Femur* is on the *Foramen Ovale*.
2. That the Thigh affected is longer than the sound one.
3. The Ends of the Foot and Knee are turn'd outwards.
4. The Thigh can't move inwards without Anguish.
5. There seems to be a Cavity in the Buttock, at least it sinks in.
6. There is an Eminence under the Groin.
7. The bending of the Buttock is lower on the Side that is indisposed, than on that which is sound.
8. When one sets the Patient upon his Feet, his Heels, and the Ends of both his Feet being upon the same Lines, 'twill be observed that when the sound Leg is strait, the other will be bent at the Knee.
9. The Patient walks as if he were mowing, that is to say, that the Thigh, the Leg, and the Foot describe a Semi-Circle.
10. The Patient sets the whole Sole of his Foot to the Ground at the same time, from his Toes to his Heels.

Explication.

Explanation.

1. The Head of the *Femur* is on the *Foramen Ovale*, because the Thigh being luxated inwards, the Head of the Bone can't find a Place better disposed to receive it: This Hole forming (as one may say) a Socket. Experience has shown it in those in whom the Reduction has never been

been made, because they walk and rest upon their Thigh, almost as firmly as if the Bone were in its proper Cavity.

2. The Thigh affected is longer than the sound one, because the oval Hole, where the Head of the Bone is, is lower than the Cavity of the *Ischion*.

3. The Foot and the Knee turn outwards, because the Thigh being dislocated inwards, is drawn on the contrary Side by the *Glutæi*; and the Leg and Foot which are joined to it, must follow and turn on the same Side,

4. The Thigh can't move inwards without Pain, because then one draws the *Glutæi* violently, which are in Contraction; besides the Head of the *Femur* bears roughly upon the *Obturator externus*, which bruises it, and increases the Anguish.

5. There seems to be a Hollowness in the Buttock, or at least it sinks in, because the great *Trochanter* which has followed the Head of the *Femur*, is forced inwards, and no longer makes a Protuberance outwards as in its natural State.

6. The Tumour that is beneath the Groin, is form'd by the Head of the *Femur*, which is then upon the *Foramen Ovale*.

7. The bending of the Buttock is lower on the Side that is indisposed, than on the sound one, because the Thigh is lower, which makes the whole Buttock come down, and consequently the bending,

8. When one sets the Patient upon his Feet, the Leg can't make it self even with the sound one, without bending it self, because it is longer than the sound one; whence if the Patient would stretch it out, he carries it forwards, or throws it aside.

9. The Patient walks as if he was mowing, and the Thigh makes a Semi-Circle, because being longer, the Patient can't carry it forwards in a strait Line, when he walks, but in a Curve; forasmuch as the sound Thigh can't raise the Body sufficiently to let the indisposed Thigh move forwards without touching the Ground; which nevertheless is absolutely necessary, that one may walk easily.

10. The Patient sets his Sole to the Ground all at a Time, from the Toes to the Heel, because the Thigh is too long, and would be much more so if the End of the Foot or the Heel rested upon the Ground: 'Tis for this Reason that they who have the Palsy, walk with yet more Difficulty, because their Leg hangs and trails upon the Ground.

Of the Prognostick.

Observation.

All the Luxations of the Thigh are fatal; but some are more so than others: The least dangerous is that which is upon the *Foramen Ovale*, wherein the Head of the Bone lodges. It is nevertheless most difficult to reduce, but whether it be reduced or no, it is always less dangerous than the others; for altho' one can't reduce the Bone, the Patient for all that, can sometimes make use of his Thigh to walk on, and he is almost always unable to use it when one don't reduce the other Luxations. This proceeds from the Head of the Bone's agreeing so well with the *Foramen Ovale*, that in Process of Time it moves there with almost as much Ease, as it did before in the Cavity of the *Ischion*: There have even been some seen where it had made it self Borders as strong as those of the Cavity of the *Ischion*.

This

This may serve to prove what I have said in Observations treating of the luxated and fractured Arm, when I proposed to reduce the *Humerus* after two or three Months Luxation; for it is easier for the Head of the Arm to replace it self in a Place where it has already been, and which is made for it, than it is for that of the Thigh to lodge it self in the oval Hole, where it has never been, and where it ought to be looked upon as a strange Tenant.

When I said that the Patient can walk, I did not mean that it was with the same Ease, because he must necessarily limp, and have all the Accidents of a luxated Thigh, except the Pain, which he has not always; but he makes a Shift to walk; and in the other Sort of Dislocations, where the Head of the Bone is not upon the oval Hole, it is most commonly impossible for him to support himself: Besides, those are dangerous after the Reduction, and this hardly is at all so; this proceeds from the round Ligament's being stretch'd, torn and broken in all other Luxations, but that which is upon the *Foramen Ovale*; because in this latter, the Bone removing at a less Distance from its Cavity, the round Ligament, far from breaking, is less extended, which is because it is fasten'd below the Center of the Cavity of the *Ischium*, towards the Bottom, and near the Side that faces the *Foramen Ovale*; this Origin gives the Head of the Bone more Liberty to issue out on that Side without breaking this Ligament.

The most dangerous of all Luxations of the Thigh, is that which is upon the *Os Pubis*, because it compresses the Vessels, whence great Accidents happen, as may be judged by the Signs that I have described; and this as well as the other that happen upwards or outwards

On the
Os Pubis
very dan-
gerous.

is

is dangerous, because of the Rupture of the round Ligament; for which Reason in these Sorts of Luxations, the Patient must be kept more quiet than in the others, and tighter Dressings be applied, till such time as the round Ligament is re-united, which is not always.

Remark.

When the Luxation of the Thigh is not reduced in 24 Hours, one runs a Risque of the Bones issuing again out of its Cavity, a little after 'tis replaced.

A Case to be observed.

It is always good to try to reduce it, tho' the Bone has been long luxated, provided the Cause be external; for when it is internal, 'twill not succeed.

There is still another Case wherein 'tis almost impossible to succeed, altho' the Cause seems external; 'tis when the Dislocation happens a long time after a Fall upon the great *Trochanter*; and, as it seems of Importance to treat fully of this particular Kind of Luxation, whereof no Author has made mention, I will give an Idea of it in the following Observation, after which we will speak of the Cure of all Luxations of the Thigh.

Observations.

A very particular Luxation.

'Tis some Years since I was called to see a Lady, who for two Months after a Fall, had complained of a rheumatick Pain, that had seized upon her Hip, and her whole Thigh. At the Recital that was made me of her Fall, and the Circumstances that attended it; I was prepossessed, even without touching her, with an Opinion that the Thigh was dislocated upwards and outwards; nevertheless before I told her Ail, I examin'd her, and found all the Signs that denote this Luxation.

I then

I then declared to her that her Thigh was disjointed. The Assistants blam'd the Surgeon who had her under Cure, because he had not discover'd this Dislocation. I inform'd them that they blam'd him wrongfully, because he had not seen the Patient but the 3 or 4 first Days, and that besides this Disease is not known, tho' very frequent, and does not manifest it self till a long Time after the Fall.

'Tis a Luxation of a very particular kind, which the Strokes don't produce at first, but of which they are the occasional Causes. 'Twas by having been deceived my self, and having reflected upon my Error, that I found it out, and give the Observation of it at present, to the End that for the future the Number of Cripples may not be so great. There are many whose limping is only caused by this Distemper's not being known in its beginning.

Many of the Profession, who were call'd in **False** as well as my self, pretended to excuse the **Brethren** Surgeon, but by such weak and extravagant Arguments as, far from destroying, confirm'd the Error of those who blam'd him. There are many such false Brethren, who only attack our Reputation by Silence; a dumb Language but so much the more eloquent as 'tis affected. As I am an Enemy to such treacherous Persons, far from being silent on this Occasion, taking part with the Truth, I assured them that the Thigh was not luxated at the Time of the Fall, but long after. This Sentence seeming a Paradox. I explain'd my self thus.

When the great *Trochanter* is struck in a Fall, **First** the Head of the *Femur* is thrust with Violence **Cause of** against the Sides of the Cavity of the *Ischion*; **this Lux-** and as it fills this Cavity exactly, the Cartilages that cover it, the *Sinovial* Glands, and the **ation.** round

round Ligament, which fastens these two Parts together, must suffer a violent Contusion, which will be followed by an Obstruction, Inflammation, and Defluxion.

ad Cause. The *Sinovia* will flow down thither in a greater Quantity, will fill the *Capsula*, or *Tunica Ligamentosa*, and the whole Cavity of the Articulation, which by Degrees will be followed by a Luxation. Because this *Sinovia* which always diffuses it self, and even then more than in its natural State, being no longer dissipated by the Motion of the Part, will force away the Bone with so much the more Ease, in that having relaxed the Ligaments, it puts them out of a Condition of resisting not only the Efforts which they make to drive the Bone from its Socket, but even those of the Muscles to draw it upwards.

Effects. Thus the Extension of the round Ligament is made by Degrees, and the Pain will increase and not diminish till this Ligament, being entirely relax'd and broken, has abandon'd the Head of the Bone to the whole Force of the Muscles that draw it upwards.

Remark. What has been now said, shews that, in this Disease, the Bone is not displaced at the Instant of the Fall, but a long time after, and by Degrees. The first Day the Bone keeps its natural Position, and the Thigh does not begin to be shortened, till the Head begins to be driven away by the *Sinovia*. One would think that the Thigh ought not to be shortened till the Head of the Bone is entirely out; nevertheless it becomes shorter by little and little, in Proportion as the Head makes its Progress outwards.

Explanation. The spherical Figure of this Head is the Cause of this; it lessens from its Neck to its Top, whence when the *Sinovia* has removed it one

Line

Line from the Bottom of its Socket, the Muscles draw the Thigh a Line upwards; and if at that Time the Thigh were to be measured from the Place where the Head of the *Femur* touches the upper Side of its Cavity, 'twould be found a Line shorter; so that if this Head is forced 4 or 5 Lines, the Thigh will be found shorter by 4 or 5 Lines, provided it be measur'd from the Place where it touches the upper Side of its Socket. Thus as much Progress as the Head of the *Femur* makes outwards, so much the Thigh will lose of its Length; and when the Head is entirely out, its Center, which in its natural State answered to the Center of the Cavity, will be found on the upper Side of this Cavity; and the Thigh will be shorter by half the Diameter of the Head: It would even be carried farther by the Action of the Muscles were it not for the round Ligament, which retains it yet in that Place.

Things being thus, 'tis easy to conceive that the Pain must increase; in Effect whilst the Head can be with-held by the Border of the Cavity, the round Ligament shares the Effort of the Muscles with it, and is extended by little and little; but when the Head is once entirely forced out, the Ligament bears singly the straining of the Muscles, and the Anguish becomes insupportable; and continues so till the Rupture of the Ligament, or its entire Relaxation, permits the Muscles to carry the Bone as far as their Contraction will suffer them. 'Twas wrongfully therefore, that they censured the Surgeon, for not having discovered a Luxation, which did not happen till a long Time after the Fall.

It must be remark'd, that the Head of the Thigh-Bone being thus carried upwards and out-

outwards, may turn either before or behind. When it turns forwards, the Knee and the End of the Foot are outwards, and when it turns backwards (which is most often) 'tis discover'd by the Signs of the Luxation upwards and outwards before-mentioned.

This Disease is incurable, when, by Reason of its not being known, one does not speedily apply the Remedies that are proper to prevent it.

Cure.

I have several Times had Success by using Defensives, made with the White of Eggs, powder'd Allum, and aromattick Brandy, where-with I moistened Compresses 8 or 10 double; I applied them all over the Articulation of the Thigh; I kept them on by a Bandage, that was only contentive, and I moistened them twice or thrice a Day with the same Liquor, without taking off the Dressings.

I placed the Patient conveniently in his Bed, and made him avoid all Motions capable of exciting Pain.

I bled him twice or thrice the first Day, and the following I repeated it more or less, according as the Pain required, and the Strength of the Patient permitted. One must not spare Blood on this Occasion, if one would avoid Obstructions in the Vessels, and Inflammations and Defluxions in the Articulation.

A moist and refrigerating *Regimen*, the refined Juice of Plants a little bitter, together with Anodynes and Narcoticks, administer'd with Discretion, are very helpful.

The Fate The Fate of these Luxations is different; of such as some there are, which cause a Palsy in the lower Extremity; others occasion Defluxions which have this Distemper terminate in Suppuration, and others in fine, per. have no other ill Consequence but limping; of these

these some leave so deform'd a Figure, that the Patients can't walk, others leave them the Liberty of walking at first with a Crutch, then with a Cane; and some there are who can go without any Support. Explication.

The Palsy is caused by the Compression of the sciatick Nerve, whereon the Head of the Femur bears; a leanness and wasting of the whole Limb, with an almost continual Chiliness, are the Consequences. Explication.

The Defluxions proceed from several Causes, some from the Pain, others from the Compression of the Blood-Vessels, and others again from the Palsy.

The Pain causes Defluxions by the Obstruction of the Lymphatick and Blood-Vessels, whence proceed Swellings, Dilatations, Ruptures, and a Diffusion and Conversion of the Matter diffused into Pus. These Abscesses are form'd in different Parts; some in the Socket of the Joint, when the Sinovia ferments, turns eager, and is changed into Pus: others in the Place where the dislocated Head resides; and there are some form'd in the Interstices of the Glutai, or the Tricipites; and, in fine, others are in the Parts that are distant from the Joint, as the Knee, the Leg and the Foot. Where the Abscesses are found

I have opened Numbers of Imposthumes of this Nature, they are all hard to be cured; but those which are most difficult are in the Cavity Cotyloide, or in the Place where the Head lodges: These remain almost always fistulous, if the Patient does not die of a lingering Fever, a Vomiting and Looseness; or a general Solution of the whole Mass of Blood, whence follows a swelling in the Legs, and Thighs, a Bloating of the Face and Hands, and a Dropsy in the Breast and Abdomen. Observation.

At other Times, these Patients don't live so long after the opening of the Imposthume, because the Putrefaction gets into the Wound, and the Mass of Blood being corrupted by the length of the Disease, the Pain, the Fever, and the Want of Sleep, render the Application of the most proper Medicines, and the best concerted Operations, fruitless.

Observation.

Oftentimes one finds the Bones rotted without being able to help it, either by Reason of the Difficulty of making the necessary Operations, or because the Strength of the Patient won't permit one to venture it.

A very remarkable Observation.

I have found in opening such an Imposthume that the Bones were *carnify'd*; I mean that the Head of the *Femur* and the Cavity of the *Ischion* being separated from each other by the Luxation, and both of them laid bare by the opening of the Imposthume, had the same Consistence and Colour as Flesh; their Size was increased, and they were so like Flesh, that they bled at the least Touch. This Observation is very particular, but I shall relate in the Sequel several that are not less surprizing, and which prove, that if the Flesh becomes Bone, the Bones will also change into Flesh.

The Abscesses that are form'd in the other Parts, have nothing particular in them, but only that they return often.

When the Luxations that are not reduc'd have no fatal Consequences, they leave the Patient the Liberty of Walking, as had been said; but he is tormented with Pains that are caused by bad Weather, and are renewed by it: They become (as one may say) living *Barometers* that foretel Rain, or fair Weather.

I have also observed, that the Bones solder themselves together by a Sort of *Callus*, as fractured

Stur'd Bones do, which forms an *Anchilosis* of a particular Kind, since in this the *Anchilosis* does not cause the Defect of the Joint, but on the contrary, the Defect of the Joint causes the *Anchilosis*.

The Deformity that remains after this Distemper, proceeds generally from the pernicious Posture which the Patient is suffer'd to lie in, it being hard to make him rest in any other but that wherein he suffers least; happy He! if this Posture is not contrary to the natural Figure of the Limb.

One of the Causes of Deformity.

They who can walk, do it with Pain at the beginning, the Crutches supply the Action of the Part; but by little and little, the Parts near which the Head lodges, become used to this new Tenant.

Of the Cure.

To make the Reduction of the Thigh, let the Bone be placed where it will, one must always make the Extension and Counter-Extension, and guide the Bone into its Socket.

Cure.

The Counter-Extension and Extension must be stronger than in the other Parts, because the Muscles of the Thigh are considerably stronger, and 'tis always necessary to get the better of their Resistance, to bring the luxated Bone near to, and even with the Cavity, into which it must enter.

Necessary Conditions.

All the Methods that we have made use of in the Reduction of the Arm, to perform these two Operations, will not agree with the Thigh, there are only the Hands, the Straps, the *Mouffles*, *Hippocrates's* Bench, and the Machine that I have described, which can be used therein.

Methods of Reduction.

The
Hands.

The Hands are less proper here than elsewhere, not only because the Muscles are stronger, but also because the Parts are too large, and cannot be grasp'd by the Hands of the Assistants.

The
Straps.

The Straps are applied in the same Manner as to the Arm, that is, to that Part of the Thigh which is near the *Condyles* of the *Femur*, to make the Extension; and the Body is withheld by a loose Strap which passes within the Groin, one End being turned under the Buttock, and the other over the Belly: They must be joined together four Fingers above the *Crista* of the *Os Ilium*, and 'tis there that it must be held by some strong Person, or that a String must be put thro' it, that is capable of resisting, and must be fasten'd to a fix'd Point, when one wou'd make Use of *Mouffles*.

I say nothing of the Manner of using the Bench of *Hippocrates*, because it is no where to be found.

Of the
Machine.

If any one wou'd take my Machine, the Buttreffs must not be slit, nor must the Thigh be put thro' it, as is done by the Arm; 'tis sufficient that there is a strong Band, like one of the two that make the Button-hole, the middle whereof must rest upon the Protuberance of the *Ischion*; and one of the two Ends where the Pockets or Sheaths are (which must enter the Ends of the Branches of the Machine) must be put before, and the other behind: The Machine must be placed between the two Thighs, and the Strap of the Thigh must be fasten'd to the String of the *Mouffles*. As to the rest, it is to be order'd as has been explain'd at full Length in the Reduction of the Arm.

3 Things
to be ob-
served.

In all these Operations, there are three Things to be observ'd: First, that the Patient be

be placed on the opposite Side, and that the ailing Hip be turn'd upwards. Secondly, that the Leg be bent; and thirdly, that the Surgeon be always attentive to what passes in the Extensions, to the End that he may make opportunely the necessary Motions with his Hands, which are different in all the Kinds of Luxations.

If the Thigh is dislocated upwards, and internally, that is to say, upon the *Os Pubis*; the inward End of the Machine must be mov'd a little backwards when the Extension begins, and it must be brought forward when one thinks it sufficient; and the Surgeon must work with his Hands so as to favour these Motions, that he may incline the Head of the Bone to take the Way of the Cavity.

First manual Operation.

If the Thigh is luxated upwards and externally, the End of the Machine must be thrust forwards, when one begins the Extension, then move it backwards, when it is thought sufficient; during which the Surgeon must work with his Hands, so as to dispose the Head of the Bone to re-enter its Cavity.

2d manual Operation.

If the Luxation is downwards and external, the Extensions must not be so strong; they must only keep the Muscles in their right State, whilst the Surgeon turns the Head of the *Femur* on the Side of its Socket, by taking the inner Part of the Knee in the Palm of one Hand, whilst with the other he leans upon the Leg near the Foot, that he may make it turn (as it were) upside down, which throws back the Head of the Bone, and guides it into its Cavity.

3d manual Operation.

I don't believe this Luxation possible, but when it proceeds from an internal Cause, at least I have never seen it.

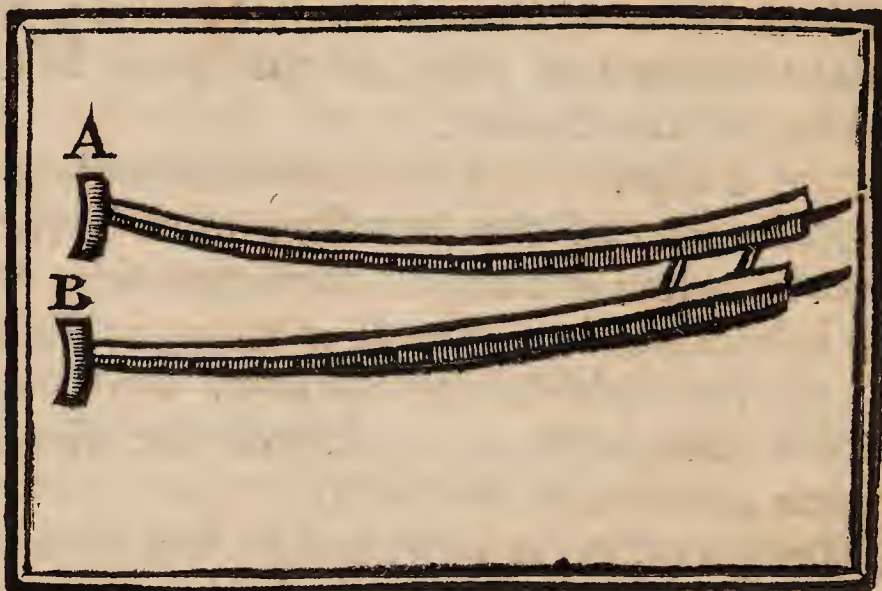
Remark.

4th manual Operation.

When the Luxation is internal upon the *Foramen Ovale*, the Extensions must be but very slight, only to disengage the Head of the Bone a little, whilst the Thigh being put up to the Groin in a Napkin (ty'd like that which was used about the Arm) the Surgeon has the Napkin drawn, whilst he bears upon the external Condyle of the *Femur*, near the Place where the Strap is fasten'd, which will draw the Head of the *Femur* back from the *Foramen Ovale*, and replace it in its Cavity.

Addition to the Machine.

I have even added to the two Branches of the Machine, two Sorts of Crescents, whereof



the one (A) half bears upon the *Os Ilium*, and the other (B) upon the middle of the Thigh; then I put a Napkin within the Groin, I make a Loop which I fasten to the String of the *Moufle*, and turning the Handle, I make three different Efforts, *viz.* The upper Crescent bears against the *Os Ischium*; the lower thrusts the Bottom of the Thigh inwards, and the Napkin draws the Top of the Thigh outwards. These three Movements are absolutely necessary to reduce the Thigh-Bone, when the Head is lodged in the *Foramen Ovale*.

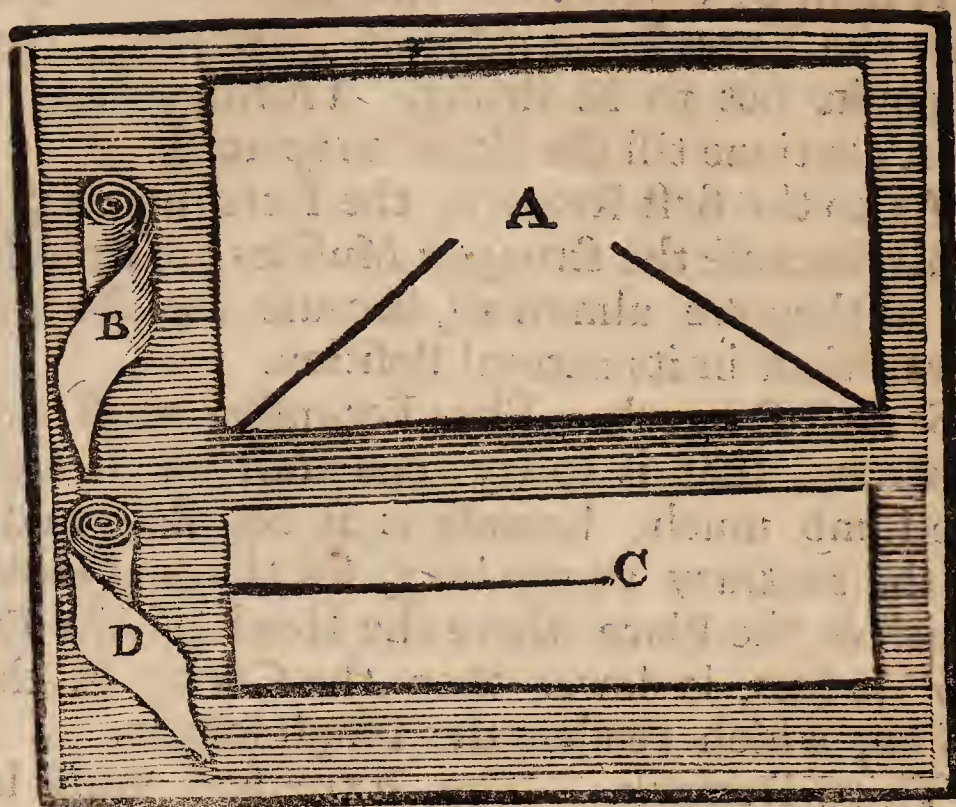
It must be observed in this Reduction; first, that the Extension is difficult. Secondly, that it ought not to be strong. Thirdly, that it must continue till the Bone is replaced.

As to the first Remark, the Extension is difficult, because the strongest Muscles are stretched, as they are almost all, because the Bone is lower than in its natural Position.

Second Remark. The Extension must not be strong, that is to say, one must not stretch the Limb much, because it is not shorten'd; on the contrary 'tis too long, for the oval Hole, which is the Place where the Head of the *Femur* lodges, is lower than the Cavity of the *Ischion*, which renders the Thigh longer.

Third Remark. The Extension must be continued till the Surgeon has drawn the Head of the Bone outwards, and placed it in the Cavity of the *Ischion*; because if the Extension were discontinued before the Bone were come to its Socket, it cou'd never get thither, and one would be obliged to begin again. It may be added, that when the Luxation is incomplete, and the Head is on the inward Border, the great *Trochanter* must be grasp'd with one Hand, and the *Femur* thrust inwards with the other, to replace the Head: And on the contrary, if it is on the outer Border, the Thigh must be mov'd inwards to make the Head re-enter its Socket.

When the Reduction is made, a very long and broad Compress (A) must be laid on 8 double; the *Spica* must be made with the Roller (B) which must be four Fingers broad, and five Ells long; the Place where the Straps were must be cover'd again with the Bolster (C) and kept on by the Swathe (D.) The Patient must keep his Bed and lie quiet; he must



be blooded, as has been said above, and observe the Diet and *Regimen* that has been prescrib'd so often elsewhere.

C H A P. XIII.

Of the LUXATION of the Rotula and Tibia.

TH E *Rotula* may suffer an incompleat Luxation without the *Tibia*'s being at all dislocated; but the Leg can never be disjointed without the *Rotula*'s following.

It luxates independantly of the *Tibia*, internally and externally; internally when the outward Cavity of the *Rotula* is upon the internal Condyle of the *Femur*; externally, when the inner

inner Cavity receives the external Condyle of the *Femur*.

The Leg cannot dislocate without the *Rotula*'s following, because the *Rotula* is join'd to it by a very strong Ligament, whence it is obliged to follow the *Tibia* when the Leg luxates, be it inwards, outwards, before or behind.

The *Rotula* suffers a compleat Dislocation when the *Tibia* is entirely luxated, and the disjoining of the *Rotula* is incompleat when that of the Leg is so likewise.

The *Rotula* never suffers a compleat Luxation by it self, nevertheless I have heard that this Luxation has been seen; but People are deceived; let us refer it to the Structure of the Part, it can never induce one to believe it. The Ways this Luxation is made.

For how can the *Rotula* dislocate downwards, if it is kept upwards by the *Extensors* of the Leg? How can it luxate upwards, if the tendinous Ligament keeps it always join'd to the Protuberance of the *Tibia*? They who have believ'd these two Luxations possible, or who say they have seen them, have taken a Fracture for a Luxation, or the Rupture of the Ligaments of the *Aponeurosis* of the *Extensors* for the Luxation downwards, or that of the Ligament that fastens it to the *Tibia*, for the Luxation upwards; and they who think that the *Rotula* can throw its self entirely on the inside or on the outside of the Articulation of the Leg, are deceiv'd in the same Manner, the Muscles cannot allow these two Kinds. Result. It remains that what has been said above of the Luxation of the *Rotula* only, or with the *Tibia*, is true, and that this Bone cannot luxate otherwise.

I was call'd to see a *Rotula* luxated upwards, because they would convince me that this Dislocation.

cation was possible: In Effect, I found the *Rotula* mounted up above a Fingers Breadth; but upon examining, I discover'd that 'twas the Rupture of the Ligament that joins the *Rotula* to the *Tibia*, and I convinc'd the Assistants of it: It is hard to break, and the Tendons of *Achilles* are not less so; and tho' the Reality of both the one and the other has been disputed, several Persons that were Judges, and worthy of Credit, have since seen both the one and the other: One under the Hands of M. *Granniers* my Brother Member; and the other under the Cure of M. *Galin*. Those who doubt, may be more amply inform'd of these Facts in the second Volume, when I shall treat expressly of them.

I am not at all incredulous in Things that I think possible, but I can't acquiesce with those that I believe, not even out of Complaisance: There are so many who would set themselves up for wonderful Persons, that they would be ashamed to relate a Fact that has been seen by others; but let us not make a wrong Use of the Word. There must sometimes be a Difference made between *Seeing*, and *Seeing*; all those who see sick Persons, don't for that Reason know their Diseases; several see more sick Persons than Diseases, but few see more Distempers than Patients. This is often for want of examining, for all the World has Eyes and Fingers, and all the World knows, or at least all the World ought to know the Structure of the Parts, and the Disorder that happens when they are hurt. They who with this Knowledge don't judge well, owe it to their not making a right Use of it. Persons may be deceived altho' they see and touch, if they don't consider, because they pass Judgment too rashly:

Advice
before
one
judges.

ly : One must first examine well, then consider, and then pass Judgment.

What I say may perhaps not be agreeable to all the World, but I flatter my self that I shall have on my Side all those who are capable of judging.

The Leg is not easily dislocated, for several Reasons.

Why the Leg is not easily luxated.

1. Because it is joined by a *Ginglymus*.
2. Because it is joined to the *Femur* in several Places, by strong, compact, and cross Ligaments.
3. Because the Ends of the *Femur* and of the *Tibia* are large, and great Part of them touch mutually.
4. It is jointed by a *Ging'ymus*, and all such Joints are the harder to luxate, because of the Multiplicity of their Heads and Cavities.
5. Its Motion is restrain'd to Flexion and Extension.
6. There is middle Cartilage which renders this Luxation more difficult, in that it deadens part of the Violence of the Motions and Blows, and raises the Borders of the Cavities, and renders them deeper.

The compleat Luxation is as uncommon as difficult, but the incompleat may happen more easily.

Whenever it does, whether it be before or behind, internally or externally, the Leg always turns to that Side which is opposite to the Luxation, which is not the same as in the compleat one ; but this does not hinder the latter's being easy to be discover'd, because the dislocated Bones cause so great a Deformity, that there needs no other Sign of their disjointing : As for the rest, the Bone turns on the same Side as the Luxation, as has been just said.

If

Prognostick.

If the Reduction is not made speedily, an *Anchilosis* will follow, because the Ligaments are almost all broken, whence their nutritive Juices are diffused and congeal themselves with the *Sinovia* of the Articulation. This will also happen even when the compleat Luxation has been reduced, if the necessary Precautions are not taken to avoid it, because 'tis sufficient for the forming an *Anchilosis*, that the Ligaments are broken, and that the Liquor of the Articulation is no longer confined, nor restrain'd from diffusing it self.

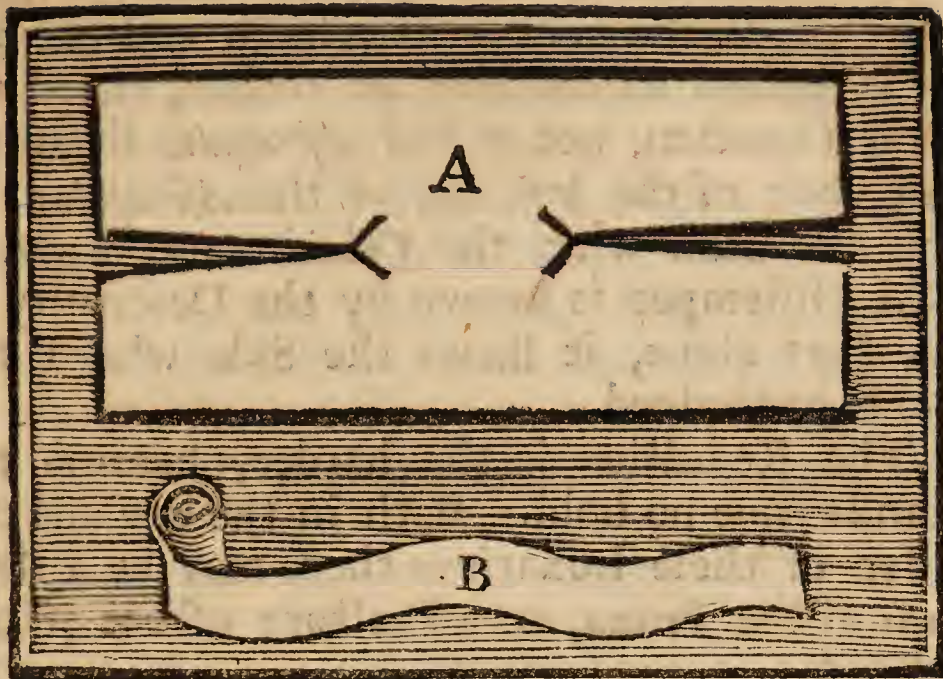
Reduction.

To reduce the *Rotula* when luxated, one need only extend the Leg so as that the *Musculi Extensores* may be beyond their *Tonus*, and press the *Rotula* with ones Hand to put it in its Place.

The Leg is reduced by an Extension and Counter-Extension in a strait Line, on whatever Side it is luxated; and it will succeed, provided Care is taken to replace the Bone in its Socket, by grasping with one Hand the Condyles of the *Femur*, and with the other the Eminence of the *Tibia*, thrusting the one against the other the contrary Way, as when reducing Fractures.

Dressings.

The Dressing is the same in both these Diseases, being only contentive of the Remedy wherein 'tis steep'd; thus after the Reduction of the one or the other, one must lay on the Compress (A) which must be 8 double, then Circumvolutions must be made about the Part with the Roller (B) rolling it alternatively in Circles and Figures of 8, till the whole Swathe is used. It must be 3 Fingers broad, and 2 Ells long. The Regimen and general Remedies must be observ'd as in other Luxations.



C H A P. XIV.

Of the LUXATION of the Foot.

THE Foot luxates internally and externally, forwards and backwards. When the Head of the *Astragalus* is dislocated inwards, the Sole of the Foot is turn'd outwards: When it is luxated outwards, the Sole of the Foot turns inwards: When it is disjoined before, the Heel is very short, and the Fore-part of the Foot seems long; when 'tis displaced behind, the Heel is very long, and the Foot seems very short.

There is a Luxation that has been sometimes taken for a Dislocation of the whole Foot, when it is but the Luxation of the *Astragalus* and *Calcaneum*, from the *Scafoides* and *Cuboides*.

Kinds.

A particular Luxation.

I never saw it but twice, and both Times it was occasioned by the locking of the Foot in some Clog, as under the Iron Bar that makes a Bridge for the Kennels under great Gates, or
some

some other Thing like it. 'Tis easily conceived that if the Foot is thus held, and the Body is carried on one Side or 'tother, there will be a Luxation, not of the *Astragalus* from the Leg, but of the jointing of the *Astragalus* and the *Calcaneum* with the *Cuboides* and *Scafoides*. This Distemper is known by the Deformity of the Part alone, it shews the Side where the Bones are lodged.

Remark. The Reduction is the harder, because the Hands have no hold. Both in the one and the other of these Luxations there may be a *Diastrasis* of the *Perona*, or a Fracture of one of the *Malleoli*.

Observation. I have seen several Times the Luxation of the *Astragalus* from the Leg attended with the Fracture of the *Perona*.

Remark. There also happens sometimes a Fracture of the *Tibia*, but what is most frequent is the Fracture of the *Malleolus Internus*, which sometimes happens alone, and often is accompanied with the *Diastrasis* of the *Perona*.

Observations. The compleat Luxation of the *Astragalus*, which some, but wrongfully, have called the Luxation of the *Malleolus*, is a very troublesome

Remark. Distemper. There are Practitioners who say it can't be cur'd, but that there will remain a Limping or Deformity: Nevertheless I have had the Advantage of curing several without leaving them any Ailment whatsoever.

Advice for the Reduction. The Way to succeed perfectly, is to make sufficient Extensions; it can't fail but when there is not Strength enough for the Extensions. For this Reason I was never contented with making Use of the Hands, I always took Straps, and would have had Recourse to Machines, if more Force had been wanting: There is no Hazard run in employing too much, it may

may be moderated; but, in not having enough, one runs the Risque of making but an imperfect Reduction, which will leave the Patient either deform'd, or a Cripple.

I fasten a Strap with two Loops above the *Malleoli*, and another with one Loop, which goes round, and grasps the Foot above the Heel and the Instep; both these Straps must be drawn by some body that is very strong, and one must take hold of the Joint to make a proper Conformation. Operati-
on.

When the Luxation is single and without Fracture, one has not always need of strong Extensions made with the Strap, but nevertheless 'tis the safest Way to use them.

When the Extensions are judged sufficient, one must observe the four following Ways of working.

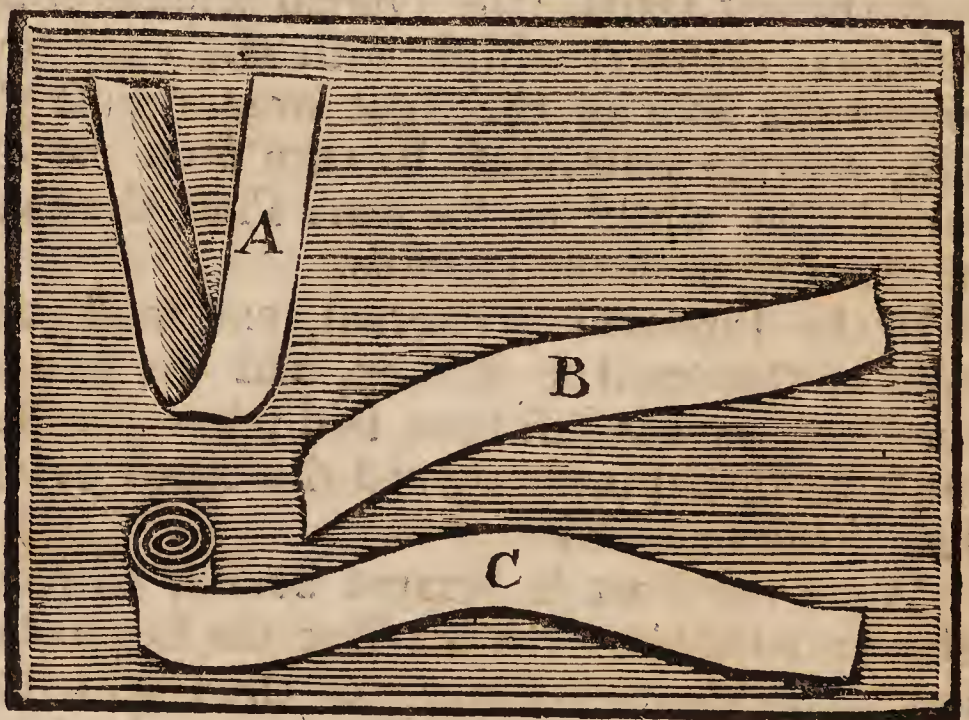
If the Foot is luxated externally, the Small of the Leg must be taken hold of near the Ankle with the left Hand. (the Thumb being over the *Malleolus externus*) whilst with the right one grasps the Sole of the Foot over against the Leg, and the Sole must be turn'd on the external Side, whilst at the same Time the Small of the Leg is thrust inwards. First Way
of work-
ing.

If the Luxation is internal, one must take hold of the Small of the Leg, and the Sole of the Foot, as has just been said; but the Sole must be turn'd inwards, and the Small of the Leg thrust outwards. Second
Way of
working.

When the Foot is luxated before, with one Hand take hold of the Small of the Leg underneath, within two Fingers of the Heel; then with the other grasp the Foot near the Joint, and push at the same Time the Foot backwards, and the Small of the Leg forwards.

In fine, when the Foot is dislocated behind, the Extensions being made (as has been said) one must hold the Small of the Leg before near the Joint, and with the other Hand grasp the Heel, and at the same Instant push the Small of the Leg towards the Heel, and the Heel towards the Leg.

The Dressing for these four Sorts of Luxations, consists of a Compress (A) four double, which is laid on like a Stirrup, a-cross the Sole of the Foot, its two Ends going, one on the inside, and the other on the outside of the Leg, as high as its middle; then another Compress (B) eight double must make a Figure of 8, passing under the Sole of the Foot, crossing it self on the Fore-part of the Articulation, and then wrapping round the two *Malleoli* going into a Circle from one to the other. To keep on the whole, take the Band (C) wherewith describe a Figure of 8 passing over the Foot under the



Sole, then from the Sole upwards; cover the *Malleolus*, and pass it behind the Foot above the Heels, then cover the other *Malleolus*, coming

ming back over the Foot and crossing the Band, from thence to the Sole, then make a Circumvolution over the *Tarsus and Metatarsus*, and begin rolling the Band till the whole be taken up. The Foot must be placed in the Hollow of a soft Pillow; the Bed-Cloaths must be supported with a Cradle, a Regimen must be observed, and the general Remedies prescribed.

The compleat Luxation where there is a Rupture of the Tendons, and Ligaments, or even of the Skin it self, is a very fatal Disease, I never saw it cured; and the only Way to preserve the Patient's Life is to cut off the Leg. One may nevertheless try to prevent it; but if in 24 Hours there is no Disposition found towards a Cure, one must not defer the Amputation; to wait longer will be too late.

C H A P. XV.

Of Sprains of the Foot.

THIS Ailment has great Relation to the *Diastasis* of the Wrist, both by Reason it occasions the same Pain, and because the Pain and the Disease continue a long while; and that both are produced by the same Causes, and have a Number of Circumstances that resemble each other.

There are several Things in the Chapter of the *Diastasis* of the Wrist that may be useful here, wherefore I refer the Reader thither; I shall only say that the Luxations and Sprains of the Foot and Wrist are long in curing, because of the Tendons that pass by this Articulation, which

which are very numerous, and don't only belong to the Foot, but to all the Toes, which has been remark'd elsewhere. Moreover each Tendon has a particular Sheath wherein it ought to slip, which facilitates the various Motions of the Limbs; and to render them yet more easy, there runs continually into their Sheaths a Liquor call'd *Sinovia*, which filtrates thro' little adjacent Glands, like those whereof we have spoken in the Anatomy of the Articulations, in treating of Luxations in General.

Upon these Remarks two Reflections may be made: First that the Numbers of Tendons which pass by each of the Articulations here mentioned, and whereof we have enlarged very much in treating of the Sprains of the Wrist, are extended; or to speak like the Vulgar, sprain'd, which cannot happen without being followed with great Pain, and an Inflammation, which will be so much the harder to cure, in that the Parts afflicted are extremely sensible.

The *Sinovia*, which is in the Sheaths of each of these Tendons, diffuses it self in their Intervals, which will cause, first an Increase of Pain.

2. A Hardness and Swelling of the Articulations.

3. Incurable Imposthumes, as shall be said hereafter.

The Pain increases; first, because the Matter compresses the Tendons, forasmuch as it takes up Part of the Place they ought to fill. 2dly, because this *Lympha* stretches the Sheath that contains it, which causes very acute Pains, because this Sheath is very sensible, forasmuch as it is of the Nature of the Tendon, and the *Aponeuroses*.

The Hardness and Swelling of the Articulations, proceed from two Causes. The first is that the Sheaths, Ligaments and Tendons which have been inflamed, are swell'd, and must for that Reason take up more Room, and consequently enlarge the Joint.

The second is, that this *Sinovia* takes up a great Space, and even forms Tumours wherein one may discover a Fluctuation, and 'tis this that is usually called a gathering of the Glears.

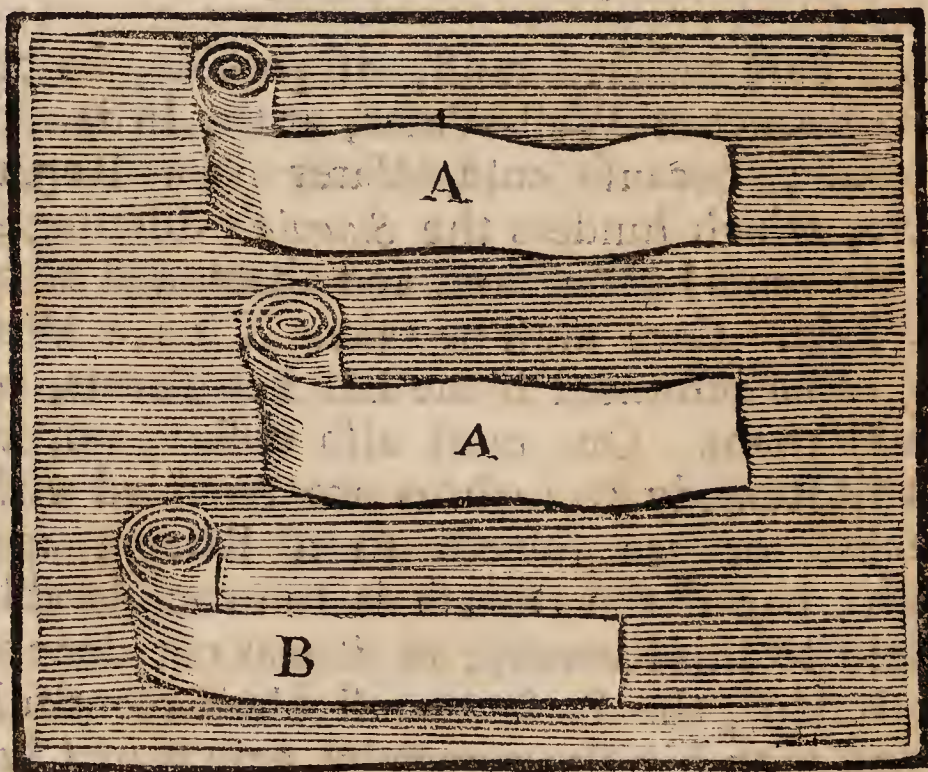
The incurable Abscesses are caus'd by this *Sinovia*, which coming to turn sowl, and fermenting, by its Stay forms a *Pus*, which corrodes the Sheaths, Tendons, Ligaments and Bones; Diseases which are the most dangerous, and the longest in curing of any, if they are not wholly incurable.

Cure of this Distemper.

The Part affected must, if possible, be put into a Bucket of Well-Water, at the Instant of the Fall; because cold Water is a Repercussive, which hinders the *Sinovia's* diffusing it self, prevents Inflammation, and abates and takes away Pain. Care must be taken if 'tis a Woman, to be informed if she has her Terms, or expects them. One must also observe not to use this Remedy to such as are troubled with Catarhs, or are subject to a Rheum and Cough; but if the Disease is too considerable to yield to this Remedy, or it was not done at that Instant, the Patient must bleed plentifully, and keep his Body open by emollient Clysters. Spirituous Liquors may be applied upon the Part, as Brandy, or Spirit of Wine camphorated, and others which shall be prescrib'd in speaking of *Anchyloses*, in Case the

Pain be moderate, or there be no Inflammation; for if these Accidents should happen, emollient and anodyne Fomentations should be made, and afterwards one should prepare Baths, and Fomentations with Henbane and Frictions, with distill'd Oils.

Catharticks, that are hydragogues, Opiates, wherein there are absorbent Powders, with *Mercurius Dulcis* and others, are very good, especially if there is any Suspicion of an internal Cause. Lastly, they put the Hand or the Foot into the Belly or Throat of some Animal, as an Ox; or else they have Recourse to hot mineral Waters, as those of *Bourbon, Bourbonne, Barege, Aix la Chapelle, &c.* One must apply the Topicks with thick Compresses, roll'd in the Shape of the Bands (AA), then make a Bandage like that in the Luxation describ'd above, taking the Band (B) 3 Ells long and 3



Fingers broad. I say nothing of Luxations of the Toes, they don't at all differ from those of the Fingers.

I hope

I hope there is nothing more wanting upon the Subject of Luxations; there will be found either in the General or particular Accounts, Means to cure all Cases, even such as we have not been able to foresee.

CHAP. XVI.

Of the Anchylosis.

THIS Word signifies a Limb that is crooked or bent at the Place of its Articulation; but they give it a much more extensive Meaning. One may call it an *Anchylosis* where the two Bones are re-united, so that they can no longer move themselves, and make but one, as if they had been folder'd together by a Matter of the same Nature as the Bone. Now as the Bones, thus folder'd at their Jointing, may either leave the Limb crooked so as it cannot be stretch'd out, or strait, so as it can't bend, that makes immediately two Sorts of *Anchyloses*; tho', according to its just Signification, it can only be proper to that where the Limbs remain crooked.

They extend yet much farther the Meaning of the Word, they take the Liberty of calling all Tumours in the Joints, which hinder their Motion, *Anchyloses*; as the swelling of the Bones, that of the Ligaments, the Diffusion of the *Sinovia*, the Dropsy of the Joints, the scrophulous Tumours that affect the *Epiphyses*, and several other Diseases of the Joints, which must nevertheless be only look'd upon as Causes of, or at least Dispositions to, an *Anchylosis*.

Extent
of the
Significa-
tion of
the
Word.

Division
of An-
chylofes.

It is proper therefore to divide the *Anchylofes* into true and false: The true are such wherein the Bones are folder'd at the Place of their Jointing, so as that they make but one Piece, and that the Motion is entirely lost, not being able to stretch themselves out if they are folder'd in a crooked Position, nor to bend if they are joined in a strait one.

False An-
chylofes.

The false *Anchylofes* are those where the Bones are not so folder'd, and wherein the Motion is not entirely lost, but only diminished by one of the Indispositions above-mentioned, or some other, whereof I shall speak hereafter.

Causes.

The Causes of this Distemper are, Fractures, Luxations, Sprains, Swelling of the Bones, Ligaments, or Joints, purulent Defluxions, and the ill Qualities of the *Sinovia*.

Fractures may be the Causes of an *Anchylosis* if they are in the Joint, if they are near it, and sometimes even if they are at a Distance.

Fracture
in the
Joint.

'Tis not hard to comprehend that the Bones, which are broken in the Articulations, shed their nutritive Juices, which are the Matter whence the *Callus* is made; and that these Juices diffusing themselves in a common Place, form a *Callus*, which folders together all the fractur'd Pieces, and makes but one of them; thus there is no more Motion in the Part, it remains in the Situation that has been given it during the whole Cure, which forms an *Anchylosis*.

Remark.

There are Fractures of the Joint which may not always be attended with an *Anchylosis*, because there will only be a Fracture of one of the Bones jointed together. For Instance, when in the Articulation of the Knee the *Rotula* only is fractured, and when in the Articulation of

the Elbow there is only a Fracture in the *Olecranon*.

When I say that they are not always attended with an *Anchylosis*, I suppose that the necessary Precautions are taken to avoid it. In these Fractures the Matter of the *Callus* falls into the Joint, and as it is impossible to hinder it, I will lay down in the Sequel the Manner to prevent, at least the Diffusions creating an *Anchylosis*. Remark.

The Fractures near the Joint are followed by an *Anchylosis*, where the Matter, whence the *Callus* is form'd, spreads its self in the Neighbourhood, confounds the Ligaments together, and incrustates them, to use that Expression; or when it fills the external Cavities that serve for the playing of the Joint, as when a Fracture of the lower Part of the *Humerus* gives the Matter of the *Callus* an Opportunity of filling the anterior and posterior Cavities that facilitate the Motion of the Bones in Flexion and Extension. Fracture near the Joint. Observations.

Altho' the Fractures are distant from the Articulations, there may happen an *Anchylosis*, when Care is not taken to stir the neighbouring Joints from Time to Time, because it gives the *Sinovia* leave to coagulate for want of Motion. Fractures at a Distance from the Joint.

'Tis a Precaution that must be taken, whereof we already made Mention in the general Account of Luxations, and whereof we shall treat exactly in the Cure of *Anchylosis*. Remark.

Luxations may produce an *Anchylosis*, because they are not reduced, or because there has been a Contusion, Inflammation, or a Neglect of moving the Bones from Time to Time during the Cure. Luxation the Cause of an Anchylosis.

'Tis easily conceiv'd that the Bones which are not reduced, cannot move for the most Part, and

and that the continual touching of the same Surfaces is the necessary Consequence of the Want of Motion, and consequently of the *Anchylosis*; forasmuch as this Touching produces two Things; one is the Co-agulation of the *Sinovia*, for Reasons that have been so often mentioned; the other is that the Ligaments, the Muscles, and all that can contribute to Motion, are (as one may say) used to rest; and when in the Sequel this Cause of rest ceases, the Articulation will not be able to move.

Remark.

Compleat Luxation.

Observation.

Observation.

The Luxations that are compleat, and not reduced, are not so subject to an *Anchylosis* as the incompleat ones. The Luxations of the Thigh, tho' not reduced, don't always hinder the Patients from walking, whether the Head of the *Femur* is lodged in the *Foramen Ovale*, or has made it self a Receptacle under the *Glutæi*, and the Parts in Process of Time are hardened and grown callous, so as not to be sensible of the Motion of the Thigh.

'Tis also observed that the Luxation of the Arm, tho' not reduced, is not always follow'd by an *Anchylosis*, especially when it is not attended with Pain, Swelling, and above all, when they have not made tormenting Tryals to reduce the Bones; because that if the Patient has any Liberty of Motion left, he preserves it, and even increases it, by making Use of his Arm for the Necessity of Life, which prevents the Adhesion which the Head of the Bone might contract with the *Omoplata*. Nevertheless an *Anchylosis* happens oftner in this Luxation, when not reduced, than in any other Articulation by a *Genu*, because the Bone of the Arm is, as it were, lock'd between the *Omoplata* and the Ribs.

It is not the same in incomplete Luxations not reduced: We see that the incomplete Luxations of the Elbow and Leg are always attended with an *Anchylosis*. Incomplete Luxation.

When a Luxation has been accompanied with a violent Contusion, an *Anchylosis* will follow, if a particular Care is not taken, altho' the Bone has been speedily and easily reduced. The Contusion sometimes affects the Cartilages and the Bones, and draws a Swelling there (which is a Sort of Inflammation:) This Swelling is capable of causing an *Anchylosis*, as shall be said elsewhere.

At other Times the contus'd Ligaments remain stiff, even after the Inflammation has ceas'd, they keep the Joints inflexible and tight, and hinder the Motion, and the Bones solder together if this Difficulty of moving continues long. This kind of *Anchylosis* is not quickly form'd, it comes by Degrees in Proportion, as the Stiffness of the Limb increases; thus the Unpliability of the Ligaments, and the Difficulty of Motion, are the mutual Consequences of each other. Contusion of the Ligaments. Remark.

If the Contusion affects the Bones, Cartilages and Ligaments, it sometimes attacks the Muscles, and they lose their Power of acting, which causes an *Anchylosis*, for Reasons that have been sufficiently particulariz'd. Contusion.

I have not forgot that the Contusion of the *Sinovial* Glands may be the Cause of this Distemper: But I shall say something of it in the following Article, and hereafter I shall treat of it at length, in speaking of the ill Qualities of the *Sinovia*. Sinovial Glands.

Sprains may occasion an *Anchylosis* by the pulling and tearing of the Muscles and Tendons, and often by the Diffusion of the *Sinovia*. Sprains cause an Anchylosis.

The tearing, or at least the forced stretching of the Ligaments, Muscles, and Tendons, causes a Pain and Inflammation in the Joint, which is very often followed by an *Anchylosis*; either because the Inflammation increases and suppurates, or because the torn Parts don't recover themselves; or lastly, because the wandering *Sinovia* spreads and gathers it self in the Cavity of the Articulation, or in the Sheaths of the Tendons. See what I have written upon this Head with Regard to Sprains, the *Diastasis*, and Luxations of the Wrist and Foot.

Remarks. This Liquor does not only moisten the Joints, but the Tendons in their Sheaths, to facilitate their Motions. 'Tis for this Reason that one sees the Tumour that happens in Sprains is not restrained to the Circumference of the Articulation; it spreads above and below the whole Extent of the Sheaths that give Passage to the Tendons: 'Tis there that the *Sinovia* diffusing it self, stretches the Sheaths, and compresses the Tendons, which augments the Swelling, and renders the Pain more acute. This hinders the Motion, and the whole together inclines the Part to an *Anchylosis*, which infallibly happens, if one don't take all the necessary Precautions to prevent it.

Inflammation before the Reduction. The Inflammation of the Joints, by Reason of Luxations, may without Doubt be looked upon as the Cause of an *Anchylosis*, when it comes before the Reduction, and hinders the Surgeon's setting the Bone, or when it follows the reducing of the Bone. Besides that such an Accident presupposes a vitiating of the Blood and the *Lympha*, there often happen Suppurations on its Account, or else there remains an Obstruction in the whole Part, which renders it unable to

to move, and in Process of Time forms an *Anchylofis*.

'Tis also known that Luxations may be attended with an *Anchylofis*, when Care is not taken to move the Articulation from Time to Time, beginning from the Day that the Pain and Swelling ceases. The Motion hinders the *Sinovia*'s co-agulating, it makes it fluid, and obliges it to return into its Receptacles; as shall be said. On the contrary, when the Part is not stirr'd, the *Sinovia*, either by its Quantity, or by its Coagulation, becomes the Cause of an *Anchylofis*.

Want of Motion what it causes.

Remark.

One of the most usual Causes of an *Anchylofis* is the swelling of the *Epiphyses*: We have Numbers of Instances in Persons afflicted with the *Evil*, the *Pox* and the *Rickets*; sometimes also in those who are troubled with the *Scurvy*, when the Blood is not turned to an acid, when the Juices, and especially the *Lympha*, are coagulated.

Swelling of the Epiphyses. Observation.

When the *Epiphyses* are swell'd by any of these Causes, the Heads and the Cavities that form the Articulation, no longer keep the Proportion they used to bear to the Ligaments; and these being too short, with Relation to the tumefied Bones, bind them so exactly, that they deprive them of the Liberty of moving. The *Sinovia* being driven from the Places where the Bones are joined, flows back upon the Sides, coagulates there, and there being no longer any Motion, the Bones solder together, either by the *Sinovia* which glews them, or by the Adhesion which they contract between themselves, in those Places where they are strongly and continually kept together.

Tumour the Cause of an Anchylofis.

The

Defluxi-
on.

The Defluxions of the Joints are sometimes the Cause of an *Anchylosis*, whether they terminate in Suppuration, or in Induration.

Suppura-
tion.

Suppuration may cause this Distemper, when it destroys the Texture of the Bone, which it impairs and rots, or when it ruins those Cartilages which render the Bones smooth and polished. If the Texture of the Bone is spoiled and rotted in the Articulation, the most fortunate Issue that a Patient can expect, is Exfoliation; the Flesh unites together, and making but one Bone of the Two, there follows an *Anchylosis*.

Caries.

The Car-
tilage de-
stroyed
or rug-
ged.

The Cartilage alone being destroyed, or only impaired or render'd unequal will produce the same Disease, because the Bones will unite if the Cartilage exfoliates; or they will only lose their Readiness in moving, if the Cartilages have only lost their Smoothness: Then the moving Faculty growing more and more troublesome and uneasy, will be diminish'd, and in the End the Bones will solder together, and produce an *Anchylosis* from this Cause alone.

Indurati-
on the
Cause of
an An-
chylosis.

If these Defluxions terminate in Induration, and neither suppurate, nor can be discuss'd, they will make the Motions of the Joints uneasy, and destroy the pliantness of the Tunicles and Ligaments, which not being any longer able to bend or yield to the Motions, will be the Cause of an *Anchylosis*.

Sinovial
Glands.

If these Defluxions attack the *Sinovial* Glands, an *Anchylosis* will follow, whether the Suppuration spoils them, or the scirrhus Induration hinders the filtrating of the *Sinovia*. In either of these Cases the Joints must be motionless, and the Bones will unite themselves, so that whatever Force is used, 'twill be impossible to give their Articulations any Play.

If the Tumour of the Bones causes them to approach so near each other, as that they solder themselves, and form an *Anchylosis*; the swelling of the Ligaments does the same, because they become shorter.

Swelling
of the
Ligaments.

The most usual Causes of this swelling are Inflammations, or an *Oedema*: The *Sinovia* has some Share in it, especially in the Gout, as shall be observ'd in the Article following.

It may have been remark'd, by all that has been said, that the *Sinovia* has a great Hand in the forming of *Anchyloses*; and there is hardly any Sort wherein it has not some Part: Its Redundance or Deficiency; its acid, fower, or ferrous Qualities, are the Sources of a great Number of Diseases of the Joints, and often of *Anchyloses*.

Sinovia
the
Cause of
an An-
chylosis.

The Redundance of the *Sinovia* may first be caused by a certain Disposition of the Blood, whereby it produces a greater Quantity of superfluous Juices than usual. Secondly, by the Obstruction of the absorbent Glands. Thirdly, by the excessive resting of the Part.

Redun-
dant of
the Sino-
via.

'Tis easy to conceive that the Blood may be disposed to furnish a great Deal of *Sinovia*, by Causes which we don't dive into, for fear of equally displeasing the Partisans of Trituration, and those who maintain the Part of Fermentation: However it be, the Blood, which supplies those with Moisture who are troubled with the watering of the Eyes, and which provides abundance of *Saliva* in the *Ptyalismus*, and which (as one may say) resolves it self into Water in the *Diabetes*, may very well supply the *Sinovial* Glands, with such a Quantity of that Liquor, that the Joints may be over-run therewith. If the absorbent Glands are obstructed, the *Sinovia* will not be carried back;

Cause of
its Re-
dundance

and

and even if the *Sinovial* Glands should only filtrate the requisite Quantity, that not having any longer free Passage, would gather in the Joint, overflow it, and produce all those Disorders which Excess is liable to create.

Physical
Explanations.

Some, perhaps, will not admit of what I have just said of the gathering of the *Sinovia*; nevertheless, 'tis the necessary Consequence of the discomposing the natural Structure, and this Disorder which causes the gathering of the *Sinovia*, does not at all differ from that which occasions the watering of the Eyes. I am to give a Proof of what I here advance, in Favour of those who are ignorant of the Structure of the Parts, or who are not in a Condition to make a just Application. All the World knows that those Parts of our Body which touch each other without Adhesion, as the *Lungs* the *Pleura*, the *Heart*, the *Pericardium*, the *Brain*, the *Dura Mater*, the *Apple of the Eye*, and the *Eye-lids*; all the World knows (I say) that these Parts are moistened in the Places where they touch, by a *Lympha*, which lubricating the Surfaces that touch each other, gives them a Readiness of moving and slipping one against the other. 'Tis not unknown that what is superfluous of this Liquor is taken back by absorbent Pores or Glands, which convey it into the Mass; I will cite three Proofs of this Mechanism: The first is in the Ventricles of the Brain, where the *Infundibulum* receives all the Humidity of the Ventricles, and carries it to the pituitary Gland, which discharges it into the *Sinus laterales* of the Basis of the *Cranium*.

Physical
Explications.

First
Proof.

The first is in the Ventricles of the Brain, where the *Infundibulum* receives all the Humidity of the Ventricles, and carries it to the pituitary Gland, which discharges it into the *Sinus laterales* of the Basis of the *Cranium*.

Second
Proof.

The second is in the Eye, where 'tis seen that after the lacrymal Gland has conveyed the Matter whence the Tears are produced, between the Apple of the Eye and the Lids, to lubricate

cate those Parts, the superfluous Remains of this Liquor is absorb'd by the lacrymal Points, which carry it into the lacrymal Ducts, and the Nose.

The Third is the following Experiment: Third
 Let a *Troisquart* be run into the Belly of a living Proof.
 Dog, then draw it out, leaving the *Canula* therein, thro' which let a Gallon of warm Water be injected; then draw out the *Canula*, and two Hours after open the Belly of the Dog, there won't be one Drop of the injected Water. But in fine, they who believe that the Bladder absorbs from without inwards, don't attribute this Effect to it; let them make Tryal of the Breast, it will have the same Success; all the Cavities have absorbent Pores or Ducts; the Throat it self is one for the *Saliva*, which flows into the Mouth, and one can't refuse this Name to the lacteal Veins in the Cavity of the Intestines.

'Tis prov'd then that there are Glands or Result. Result.
 Pores which absorb the Superfluity of the Fluids, that diffuse themselves in Sheets over the Surface of the Parts whereof we have been speaking; and if we had not Proofs of their Existence, we should be obliged to suppose them, to give a Reason for several *Phænomenas*, as well natural, as the contrary; for Instance, the watering of the Eyes is caus'd by the Obstruction of the lachrymal Points; these Points are the absorbent Pores of the *Lympha Lachrymalis*, when this Liquor is no longer absorb'd, nor convey'd into the Nose, it falls in Tears down the Cheeks, which is call'd the watering of the Eye.

The same happens in the Articulations of the Bones; there are *Sinovial* Glands which supply the *Sinovia*, and absorbent Pores that carry it back. Applica-
tion of
the Ex-
ample.

back. The Obstruction of these Pores is one Cause of the gathering of the *Sinovia*, and, perhaps, in Consequence of that, one of the Causes of the *Anchylosis*, if this accumulated Liquor acquires a viscous Quality, whereof we shall make mention in the Sequel.

The keeping of any Part excessively still, occasions the gathering of the *Sinovia*; 'tis known that the moving of the Bones contributes not a little to the Motion of this Liquor, because it augments its Fluidity, and hastens its Introduction into the absorbent Pores. Rest therefore is the Cause of the Redundance of the *Sinovia*, which may afterwards produce an *Anchylosis*.

The Want of *Sinovia* is caused, 1st. By the Disposition of the Blood to produce little of this Liquor. 2. By the Obstruction of the *Sinovial* Glands; and 3. By the excessive moving of the Articulations.

If the Blood can be disposed to produce too much *Sinovia*, by a contrary Disposition, it may not produce enough. The Nose, the Mouth, and the Eyes are dry, when the Blood does not supply the *Mucus*, the Spittle, nor the Tears; and the Body is bound in those whose Blood does not furnish the *Lympha* of the Intestines. Sweating is in vain hoped for in Distempers where the Blood is not inclined to furnish the Matter that causes it; and the Urine which passes in great Abundance when one has taken Diureticks, will not pass at all when the Blood is in a Disposition contrary to that which these Remedies are sometimes capable of giving it. By a like Cause the Blood may not be inclin'd to furnish the *Sinovia*, and the Joints will be dry and without Unction.

Parallel.

The Obstruction of the *Sinovial* Glands will have the same Effect, since 'tis the same Thing to the Joints, whether the Blood will not supply the Glands with *Sinovia*, or the Glands refuse to receive it.

Excessive Motion disperses the *Sinovia*, continual Friction heats the Cartilages, Ligaments, and Muscles of the Joints, and creates a *Phlogosis* in the *Sinovial* Glands, which puts it out of their Power to furnish Unctuosity. Thus by Effects of one of these three Causes, or all together, the these 3 Joints will be without Unction, they will rub Causes harshly against each other if they move, or perhaps they will be so dry that 'twill be impossible to stir them, and the forc'd Rest, which is continued by the Cause's remaining, will be quickly follow'd by an *Anchylosis*.

The Acidity of the *Sinovia* may be derived The from the Blood whereof 'tis Part, or by its Re- Causes of sidence in the Joint, when detained there by the Sino- any of the Causes abovemention'd. The Aci- via. dity which it derives from the Mass of the Blood, may have different Degrees, and various Causes.

A certain Degree of Acidity will only render the *Sinovia* too fluid, it will lose the Unctuosity which makes the Motion of the Joints easy, and causes the Bones to slip one against the other without Noise, and to rub even the Muscles that move them, and the Ligaments that with-hold them, without Pain. The Acidity which destroys the Unctuosity of the *Sinovia*, will do the contrary, the Bones will not be able to slip with Ease, but they will rub harshly against each other, and the Motions will be grating and painful.

If the Acidity increases, all will increase, Effect of the Cartilages will not only be deprived of the the Aci- undti- dity.

unctious Liquor that lubricates them, but their smooth and polished Surface being corroded by the acid, will become uneven and rugged; and the Ligaments that were insensible of the moving of the Bones, and the Touch of the natural *Sinovia*, will, even in their State of Inaction, be susceptible of Pain. The working of the Acrimony will irritate them, and cause a *Phlogosis*, by so much the more painful, as they are fastened to hard and inflexible Bodies, which cannot, by giving Way, share with them in their inflam'd Tension.

Increase
of Acci-
dents.

By this Time the Articulation is inflam'd, the Acrimony ferments with the nutritive Juices, and in a little while the rotten Bones, and the suppurated Ligaments will form one of the most dreadful *Anchylofes*.

The
Lympha
the Vehi-
cle of the
Salts.

The Causes of the Acidity of the *Sinovia* are various, a bad Diet may corrupt the Mass of the Blood, and turn it acid; and as Acids are Salts, and Liquids are the Vehicles of Salts, 'tis not wonderful that the *Lympha*, which is the Vehicle of the whole Mass of Blood, should also be that of the acid Salts; and as the *Sinovia* is as an Emanation of the *Lympha*, 'twill not be surprizing that it acquires this Acrimony, which is capable of causing all the Disorders abovementioned.

Cause of
the ill
Qualities
of the
Sinovia.

A bad Diet is not the only Cause that will turn the sweetest Liquors acid. The Contact of certain Bodies that perspire, may also very well occasion it, for there are in the Blood Dispositions contrary to Nature that are contagious. We shall speak of them hereafter.

'Tis also observ'd that the *Sinovia* may become acid by its Stay in one Place. Rest gives the acid Salts Time to unfold themselves: It has even been seen several Times that the *Sinovia* being co-
agula-

lated by Sowers, has become Sower it self, and has afterwards turn'd acid by another Degree of Fermentation; in the same Manner as Milk turn'd sower, becomes acid after another Degree of Fermentation more or less. Thus the Stay of the *Sinovia* may be the Cause of the Acrimony it acquires. 'Twill be seen hereafter that the same Rest may well incline it to Sowness, and that the whole depends upon a Degree of Fermentation more or less, which can't be determin'd. However it be, these Sorts of vicious Qualities are often the Causes of the *Anchylosis*.

We ought to judge of the Sowness of the *Sinovia* as we have of its Acidity, it may derive this Quality from the Mass of the Blood, or may acquire it by its Stay; the Causes being the same, we shall say no more of it; we shall only observe that the Sowness of the *Sinovia* is sometimes the Effect of the Pox, or the King's Evil, and that the acid is generally occasion'd by the highest Degree of the Scurvy.

The serous Quality of the *Sinovia* (whereof I have given a particular Character) is not always, there are sometimes Effusions of Water in the Cavity of the Articulations, that one may call arthritick Dropsies, which are often caused by the Acrimony of the *Sinovia*, whereof we have spoken, and which I have known to be the Consequence of the Coagulation of the *Sinovia*, which has fermented to such a Pitch, as to dissolve and reduce it self into Water.

When the congeal'd *Sinovia* does not resolve into a serous Matter, it hardens and produces the arthritick gouty Knot, whereof we shall speak in the Sequel of this Chapter.

Arthri-
tick
Knots,

Lympha
in scor-
butick
Perfens.

We shall also observe that the *Sinovia* being coagulated by a Sowr, may very well be a Symptom of the Scurvy, because this Disease begins by Coagulation, and generally ends in Dissolution. 'Tis even seen that Coagulations caus'd by the scrophulous or venereal *Virus*, end in Solutions that tend to Acidity. The Nature of the Salts, and Turn of the Fermentation decides it; at least 'tis the best Conjecture we can make upon this Matter, which is very problematical.

If People wou'd determine the *Species* of *Anchyloses* by their Causes, it might easily be done; I have particulariz'd them in such a Manner, that I believe I have forgot none. They who desire to do it, need only run over each Kind, and give it a Name suitable to the Character of the Causes that produce it. Nevertheless, one may at first divide them into true and false, as has been said in the Beginning of this Chapter.

Besides, it may be discover'd that some are produced by external, and some by internal Causes: External, as those which are occasion'd by Blows, Falls, and violent Motions, and which are only the melancholy Consequences of Fractures, Luxations, Sprains, or Contusions.

Internal, as are all which proceed from the vitiating of the Blood, whether its vicious Quality has no particular Character, or it bears the Marks of the Evil, the Pox, the Scurvy, or the Gout.

Signs.

'Tis not necessary to give many Signs whereby to know a true *Anchylosis*: The Impossibility of moving the Bones at their Joints, the invincible

cible Resistance they make against Flexion and Extension, because they are not any longer but one Piece, are sufficient Marks to characterize a true *Anchylosis*.

Neither have the other Indispositions which we have said are false *Anchyloses*, need of any other Judges than the Sight and the Touch; but to distinguish the Causes which have produced them, it is necessary to add together all that the Senses and Reason can suggest to us.

'Tis known that that which is produced by the Fracture of all the Bones of a Joint, is not only found out by the Signs which at first discover'd the Fracture; but also by the Swelling of the Joint, which at first is painful, by the Difficulty of moving it, which increases by Degrees, so that at length 'tis impossible for the Chirurgion to bend the Joint, tho' he should even join his whole Strength to that of the Patient.

When one observes what passes at the Fracture of the *Rotula*, or *Olecranon*, if an *Anchylosis* follows, there is no Doubt whence it proceeds. What is certain is, that these come more slowly than those which happen in a Fracture of all the Bones of the Joint, and that it is more easily avoided, as shall be said.

The *Anchylosis* that is distant from the Fracture is easy to be known, when this Disease comes, one is not deceived by the Signs that foretell it, since 'tis generally caused by Negligence, and is yet longer in forming than the two others.

The Signs whereby we know that the *Anchylosis* is occasion'd by Luxations not reduced, are the same with those we have given of Luxations; to which may be added the Swelling that

follows, and the Adhesion of the Bones which takes away all Power of moving the Joint.

The Signs, that the *Anchylosis* is the Effect of an incomplete Luxation, are also contain'd in the Signs that I have given of this Sort of Luxation; and as for the *Anchylosis* that follows a reduced Luxation, it will be discovered by examining the Accidents that preceded it, as a Contusion, Inflammation, Swelling, or the Efforts that were made to reduce it; or else one must look into what follow'd the Reduction, as a Continuance of Pain, or the keeping the Part too long without Motion.

As for the Signs which discover that the *Anchylosis* is caused by a Sprain, 'twill be known that the Patient has made some Effort, or false Step, that a Tumour followed, that he has not observed a proper Diet, and that the general Remedies have been neglected; and it may be distinguish'd whether the *Sinovia* of the Articulation only has a Hand in the *Anchylosis*, or if that which moistens the Tendons and their Sheaths is also included; because that if the *Sinovia* of the Articulation alone occasions the Swelling of the *Anchylosis*, it is restrain'd to the Circumference of the Joint; but, when that of the Tendons and Sheaths has a Share in it, the Tumour extends it self a great deal above and below it: Besides the Swelling is unequal, because the Sheaths don't take up the whole Circumference of the Part; and that moreover there are circular Ligaments which withstand the Swelling at the Place where the Tendons pass over the Joint, which often causes a Sort of Obstruction in the Part. When this gathering of the *Sinovia* is considerable, the Bones are sometimes separated from each other, and don't touch; this is sensibly perceived in
the

the Articulation of the Leg with the Thigh. Lean your Hand upon the *Rotula*, it seems to fluctuate; press upon it, you will not find any Resistance, till by your pressing you have dispersed all the *Sinovia* that is between it and the *Condyles* of the *Femur*; and if you take off your Hand, the *Sinovia* will lodge it self again between the *Condyles* and the *Rotula*.

These last Signs are marks of the Redundance, and gathering of the *Sinovia*; but it is difficult to distinguish all the Causes, which, as we have said, are apt to make it gather. 'Twill not be easily found out what is the Cause that renders the Blood fit to supply this Liquor in great Quantity: Neither have we any Signs whereby to discover the Obstruction of the absorbent Glands; but one may know by the Relation of what has passed, whether excessive Rest has occasioned the accumulating of the *Sinovia*.

The Acidity of the *Sinovia* will be known by the Pain, the harsh Friction, and the grating of the Articulation; there happens a Sort of *Cliquetis*, but to be assured of that, the Habit of the Body must be examin'd, whereon there will be Tetters and Boils. One must also remark whether it has remain'd long in the Joint. because its Stay occasions a Fermentation, which usually turns to acid or sour.

There are no Signs whereby to discover a sour or an acid, but those which attend the Diseases of this Kind, whereof the *Anchylosis* is the Consequence, for Instance; the Signs of the Scurvy, the Pox, the Evil, or the Gout.

Prognostick.

The *Anchylosis* that comes at the Fracture of the Joint is incurable, because it proceeds from the Effusion of the Matter of the *Callus*, which has folder'd the united Bones.

But if the foldering is not yet perfect, and that but one of the united Bones is broken, as the *Rotula* at the Knee, or the *Olecranon* at the Elbow, the *Anchylosis* not being quite form'd, one may sometimes prevent it, as shall be said. 'Tis the same in Case of the *Anchylosis* that comes after a Fracture near the Joint.

The *Anchylosis* that happens after a Fracture distant from the Joint, is not always incurable, because it does not proceed from the Matter of the *Callus*, but only from the *Sinovia* that has been suffer'd to gather and coagulate in the Joint, by not stirring the Part from Time to Time during the Formation of the *Callus*. The *Anchylosis*, occasioned by an incompleat Luxation not reduced, is absolutely incurable when once form'd; it may sometimes be cured in the Beginning, when the Bone can be reduced, and one observes all that is requisite in the Cure of *Anchylosis* and *Luxations*.

The compleat Luxation, tho' not reduced, is not always attended with an *Anchylosis*, and the Patients can even assist themselves with their Limbs, tho' dislocated, provided they make use of them when they are no longer in Pain.

The *Anchylosis* that happens after the Reduction of the compleat Luxation, is troublesome, if it is caused by the Contusion of the Parts; the Blow or the Fall which produced the Dislocation may have occasioned the Contusion; the

Bones

Bones themselves being thrust violently against each other, may be mutually bruised; and 'tis observed that this Sort of Contusions are very fatal, because they occasion the inflaming and swelling of the Part, whence comes an Obstruction and Stiffness in the Ligaments, and consequently a Difficulty of Motion, or else a Suppuration, the Effect whereof is the Destruction of the Cartilages, and *Caries* of the Bones; and the Patient is very happy if he comes off for an *Anchylosis*: Very often this Contusion causes the Gathering and Stay of the *Sinovia*, which produces a Sort of *Anchylosis* that indeed is less troublesome than the others; but altho' it may sometimes be heal'd, the Cure is too painful for the Patient and the Surgeon.

The *Anchylosis* that comes after the Reduction, and which is only caused by the coagulating of the *Sinovia*, is not so troublesome: One may often cure them, provided the Bones are not solder'd, and that there is still some Fluidity in the *Sinovia*.

The *Anchylosis* that proceeds from the Acrimony of the *Sinovia*, is more fatal than that which is caused by its Sourness, because 'tis seldom that the Acidity does not destroy the Ligaments, the Cartilages, and the Bones themselves, which complicates this Distemper, and makes it incurable, the rather in that the Scurvy is the Cause; and 'tis known how hard it is to cure the that Disease, when it has begun to attack the solid Parts.

When the *Anchylosis* proceeds from the Predominancy of Sourness in the *Sinovia*, it is not so fatal, because Sourness coagulates this Liquor. The Coagulation keeps all its Salts inactive that they don't operate, and the Solids are sheltered from their working, at least for a

Time, till the first Principles of this Liquor ferments a new ; for it has been observed, in the Causes of the congealing of the *Sinovia* by Sowrs, that they may by again fermenting become acid : However it be, 'tis always good to say that the Coagulation is less fatal than the Solution. But of two Causes of its Coagulation, *viz.* the venereal Sowr, and the scrophulous Sowr ; the latter is infinitely the most troublesome, because we have a Specifick for the Pox, and we have but Palliatives for the Evil ; at least it is common to cure the Pox, and very extraordinary to cure the Evil ; inso-much, that it may be said the pocky *Anchylofes* are curable, and the scrophulous ones seldom healed. One may add, that the scrophulous Ferment may be eradicated without curing the scrophulous *Anchylosis*, and 'tis seldom that the pocky *Anchylosis* is not healed, when the Bones are not quite folder'd.

The *Anchylosis* that proceeds from the Dropsy of the Joint, is less fatal than that which is produced by the pargetty or plaistery Concretion of the *Sinovia*, unless the scorbutick or scrophulous Ferment is the Cause of the *Sinovia's* Solution into Water. The Cure of the *Anchylosis* is palliative or Radical ; the Palliative is only proper to mitigate the Pain of such as have incurable *Anchylofes*, which we have termed true ones, such as those where the Bones are entirely foldered ; the Radical Cure is for those we have termed false, and which not deserving the Name of *Anchylofes*, have been looked on as Dispositions tending to this Distemper, or as the Causes that produce it.

The true *Anchylofes* ought to occasion no other Accidents but the Loss of Motion ; 'tis an indispensable Consequence of the foldering of
of

of the Bones that form a Joint ; therefore the soldering of the Bones is not capable of producing it by it self: When the Bones are soldered together after its Fracture in the Joint, the Accidents that attend and follow this Distemper from the Beginning, are, Swelling, Pain, and Defluxions.

All these Accidents which at first were caused by the Blow, or Fall, are countenanced by the Obstruction that remains after the Conformation of the *Callus*; the Ligaments being choak'd up can't easily recover themselves, because the Vessels that belong to them, and even those that are near them, are obstructed by the Compression caused by the Bigness of the *Callus*; and this Disorder which destroys the Joint, must cause a considerable Confusion in the *Synovial* Glands, and in the flowing of their Liquor.

All these Things, which must be looked upon as the Causes of the Swelling, the Pain and the Defluxions, prescribe the Use of a *Regimen*, general Remedies, and Topicks.

The Patient must not observe a severe Diet, he must only be moderate in the Quantity of his Food, regular in his Hours of eating it, and very circumspect as to the Quality of it. Fresh and moist Victuals are proper; Ragouts, sower Fruit and Milk, are absolutely contrary.

He must keep both his Mind and Body at Rest; the affected Part must not be moved but very moderately, and the whole answerable to it. I mean one must not attempt to move the Place of the Articulation, not only because 'tis impossible to recover its Motion, but also because it wou'd occasion fresh Irritations, and consequently Pain, Tumour and Defluxions. Besides Motion, which is useful for the Cure
of

of some Sorts of *Anchylofes* where the *Sinovia* abounds, or is clotted, is entirely impracticable in this Case, because the Bones being folder'd by the *Callus*, will not allow of any Motion.

What must be done then, if the *Sinovia* seems to be gathered in some Place near the Joint? One must make Frictions with hot Cloths, to supply the Defect of Motion in the Joint, and to keep the *Sinovia* as fluid as possible; by the often reiterating of these Helps, which are what Surgery makes Use of to supply Defect of Motion; this Liquor will be attenuated, and the Topicks proper to dispose it may work more effectually.

For this Purpose one must use Pumpings of hot Water, which must fall from a great Height, to the End that they may penetrate the better. If the *Sinovia* is very outwards, it will not be long before the Success of this Remedy is perceived; if it is deep, it requires more Time.

When the *Sinovia* seems coagulated, one must dissolve some *Sal Marine*, or *Sal Armoniac*, in the Water. This pumping is very effectual, it must be repeated several Times a Day, and must be given for a longer or shorter Time, according as the sick Person can support it patiently.

If this Remedy don't disperse the *Sinovia*, 'twill at least render it more fluid, and in a Condition to be dispersed by other Means. Frictions made before the Fire with Spirit of Wine and Lavender, and Fomentations of aromatick Wine often repeated, are very successful; but these must not be used till the Pain is considerably abated: We will mention elsewhere what must be done to allay it, when we
treat

treat of the Means to prevent or cure De-
fluxions.

'Tis also known that hot Waters are perfectly good to dissolve and disperse Obstructions in the Joints; those of *Aix la Chapelle*, *Bourbon*, *Bourbonne*, *Barege*, and others are in great Reputation; a great Number of sick Persons go thither every Year, and return cured or eas'd. These Waters are used for Baths, Pumpings, and even to drink; some of them produce Slime or Mud, which being applied hot like a Cataplasin, liquefys and dissolves the Matter that causes the swelling of the Joints. I have known several Distempers of this Sort perfectly heal'd thro' the Means of these Waters.

When there is a Disposition to an *Anchylosis* in Consequence of the Fracture of a Joint where there is but one Bone, it ought to be moved gently, and repeated every Day that the Dressings are taken off, afterwards every other Day, and then every Day: By this Means 'twill prevent the Matter of the *Callus* from diffusing it self between the *Condyles* and the Cavities, where it would coagulate and form irregular Prominences which would stop the Motion, and solder the Bones.

I have known an *Anchylosis* of the Knee, where the Bones were not yet united; it was caused by the Fracture of the *Rotula*; the Matter of the *Callus* had penetrated between the Eminences and Sockets of the Joint: The Stiffness of the Knee made it apprehended that there was a perfect *Anchylosis*, but the stirring it, which had been neglected till then, was put in Practice with so much Success, that in less than a Month the Patient bent and extended the Leg sufficiently, to walk with Ease enough.

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The *Anchylofis* that happens after Fractures near the Articulation, is only caused by the spreading of the Matter of the *Callus* about the Ligaments, or else by the Rest, which certain Persons, little versed in the Surgery of the Bones, very unreasonably make the Patient observe, more exactly on this Occasion, than on any other.

To avoid an *Anchilosis*'s being caused by either of these Things, the fractur'd Part must first be placed so that the Matter of the *Callus* may have a Bias to carry it from the Articulation. Secondly, Compresses must be applied, supported by several Circumvolutions of Bandages between the Articulation and the Fracture, which by a soft Compression will serve as a Rampart against the Matter of the *Callus*.

In fine, the Joint must be moved, and sooner in this Case than any other. One must not follow the Error of those who pretending to be expert in this Part of Surgery, are not asham'd of saying they are infallible: The Truth is, they only seduce the Vulgar, or at most only those of a better Rank, who believe they know all, without having learnt any Thing. Not to fall into the same Error, on the first taking off the Dressings, in a Fracture of this Kind, one must begin to move the Articulation, the Bones run no Hazard of displacing. This Fear, which is common to all Bone-Setters, tho' without Foundation, is regularly observ'd by such as don't reflect that when the Fractures near the Joint are reduced, they are not easily displaced, because that a much greater Part of the broken Bones join together, than in those which are fractured in the middle, the Middle of Bones being much smaller than their Ends.

As for the *Anchyloses* that are the Consequences of Fractures at a Distance from the Joint, Motion alone will prevent them, and will even cure them, where a Redundance or too great Thickness of the *Sinovia* has already inclined the whole Joint to an *Anchylosis*. One may also use the Topicks prescribed heretofore. The Dispositions to an *Anchylosis*, that proceed from a reduced Luxation, are directed by the following Means.

If there has been a Contusion by the Blow, or the Fall, or by the ill Management of some ignorant Person; one must bleed the Patient considerably, then put anodyne Cataplasms upon the Part, then partly Dissolvents with the Anodynes, and afterwards Dissolvents alone; and when the Pain and the Swelling is over, one must begin to move the Part gently, without forcing any Thing, that one may not draw a fresh Defluxion which may be more fatal than the former.

If the Tendency to an *Anchylosis* proceeds from having overthrown the Sides of the Cavity in the Time of reducing the Bone, or from not having conducted the Head of the Bone by the same Way which it took in issuing from its Place; one must make Use of the same Remedies as in the Case aforegoing; but I doubt whether the Cause can be taken away, I mean that the Sides can't easily be raised that are overthrown, and that it seems yet harder to me to remedy the last Error, because that the ligamentous Tunicles of the Articulation being pinched, between the Head of the Bone and its Cavity; one must displace the Bone to set it better, after having disengaged the Tunicle.

If after the Reduction they have neglected moving the Part, it must be help'd, as has been
alrea-

already said, in speaking of the same Error with Regard to Fractures.

When the Bone is not reduced, one must observe whether there be a Tumour, Hardness, Inflammation and Pain, or whether the Part has retained almost its natural Situation. If there be a Swelling, Tension, or Inflammation, Recourse must be had to general Remedies and Topicks; and when these Symptoms are over, one must try to reduce the Bone: If it succeeds, the *Regimen* and Topicks must be continued; and if it fails, the Patient will be lame, and an *Anchylosis* will follow, as has been said in the Causes.

If there is no Inflammation nor Pain, the Patient should bleed twice, and then the Reduction should be attempted, unless the Luxation be of too long standing. I have set Arms that had been six Months and a Year dislocated; and in others that have been luxated but two Months, I have not been able to succeed, nor others after me; which may proceed from the *Sinovia* that fills the Cavity of the Joint, or the Tension of the Muscles. After having in vain attempted it, I advised a Person to the Waters of *Bourbon*, which dispersed the *Sinovia*, and made the Muscles pliant; he came back Post to *Paris*, and I made the Reduction with Ease. Another Person of the Duke *D'Albe's* Retinue had dislocated his Arm six Months, I could not reduce it, he went to the Waters of *Barege*, and a Surgeon of *Bayonne* set it two Days afterwards with a great deal of Ease.

We have said that an incompleat Dislocation not reduced is sooner attended with an *Anchylosis*, than that which is compleat; neither have I ever seen a Tendency to an *Anchylosis*, proceeding from this Cause, cured, when a
Month

Month had escaped without making the Reduction: Nevertheless, I advise making the Attempt to replace the Bone, the worst that can happen is not succeeding; and the Surgeon has nothing to reproach himself, provided he does all that Art prescribes: Besides, it succeeds sometimes, and 'tis sufficient that it may once do, to determine us to make the Attempt.

It is easier to heal those Dispositions to an *Anchylosis* which proceed from the want of *Sinovia*, than those that are caused by its Redundance, unless the Want is occasioned by the Want of the *Sinovial* Glands, as has been observed in the Cause of it.

If the Joints of any one are without *Sinovia*, because the Blood is not disposed to supply the Glands with it; one must bleed the Patient, make him observe a *Regimen*, prescribe the general Remedies, and let him use dilating Broths, Drinks that are mildly bitter, Baths of emollient Plants, gentle Purges, light Frictions upon the Part affected, and emollient Cataplasms, wherein some black Soap must be put; all these Remedies are proper. Pumping ought not to be omitted, it works Miracles every Day in the *Cliquetis*, which is a Disposition tending very much to an *Anchylosis*.

On the contrary, if the *Sinovia* abounds too much, the Patient must bleed more plentifully, especially if the Excess of that Liquor causes Tension and Pain; he must be confined to a very exact Diet, he must take Broth and Drinks that are gentle Operatives, the Part must be chafed with hot Cloaths, and dissolvent Cataplasms be laid upon it; one must use Pumpings with a Decoction of the same Plants, and often move the Joint to oblige the *Sinovia* to re-enter its Receptacles: and if this don't suffice, lay
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on a Cataplasm of dissolving Herbs, adding to it aromattick Plants, Snails, or Frog's Spawn; I use Pumpings of Lime-Water, together with a Solution of *Sal Armoniac*. This Liquor is excellent on Account of the volatile Salt that separates from it, which is very proper to render the *Sinovia* fluid; 'tis a Remedy of my own Invention, which I have made Use of very successfully, not only on this Occasion, but many others.

The Time and Manner of moving the Joints that are inclin'd to an *Anchylosis*, is not an indifferent Thing. As to the Time, it ought always to be when the Violence of the Pain is over; it is dangerous to make these Sorts of Motions, as long as it continues, for that would increase it, and Convulsions, Faintings, and Death it self would follow.

The Manner of stirring them depends upon the different Motions which the affected Joint is capable of. The Joints articulated by *Genou*, must be moved gently, and in a Round, taking Care never to force in any Degree the narrow Bounds prescribed by the Ligaments. 'Tis for this Reason that the Arm must never be turned round, without being at a little Distance, and the Thigh in Proportion; the Fore-Arm and the Leg must not be extended beyond their strait Figure, nor be bent but a little beyond the right Angle, so that in bending them one must never make the fore Part of the *Cubitus* touch the Arm, nor the Calf of the Leg the hinder Part of the Thigh; it would cause Extensions and tearing of the Tendons, which would soon be attended with more melancholy Symptoms.

The *Sinovia* often coagulates, in Spite of the Use of all these Remedies, and folders the
Bones,

Bones, and forms an *Anchylosis*. At other Times this Liquor dissolves, and is changed into Water, and either thro' the Fault of the Receptacles destin'd to carry it back, or perhaps because being watery, it has not Configuration proper to pass thro' them; it remains in the Joint, and forms a Dropfy: Then nothing being able to disperse it, a Puncture must be made with the *Troisquarts*, or with the Lancet, but Care must be taken not to be deceived in mistaking an *Oedema* for a Dropfy.

The *Oedema* seizes on the Cells of the Fat, and the Dropfy on the inner Part of the Articulation. The Tumour of the *Oedema* blends it self with the rest of the Limb, that of the Dropfy is confin'd within the Compass of the Tunicle of the Joint. The *Oedema* has no Fluctuation, the Dropfy discovers it self chiefly by this Sign. In the *Oedema* the Bones of the Joint are brought near one another, in the Dropfy they are separated. For Instance, if there is a Dropfy in the Knee, the *Rotula* juts out, because the Water that is dissolv'd, removes it from the *Condyles*; on pressing the *Rotula*, it gives Way to the Finger, untill it touches the *Condyles* of the *Femur*, which is, when by thrusting it, all the Water is forced away that was between it and the *Condyles*.

Again, one must not take a Fluctuation of glearous Matter for a watery Fluctuation; Water answers clearer than Glears, these have but an obscure Fluctuation.

When a Person is convinced that there already is an Effusion, he must make the Puncture with the *Troisquarts*, or the Lancet. I have never made this Operation but with the Lancet; I don't doubt but the Use of the *Troisquarts* is as good as the Lancet. When this O-

peration is made, whether it be with the one or the other, Care must be taken to place the Part so as the Puncture may be made in the shelving Place, that the Waters may not stay in any Corner of the Articulation.

The thickest Parts of the Joint must not be pierced; on the contrary, the smallest must be chosen, to the End that fewer Parts may be pierced: Those must be chosen preferably to others where there are no *Aponeuroses*, because that Accidents may happen thro' the Division of those Parts; one must press all the Neighbourhood of the Joint very exactly, thus the Water may be expelled more exactly.

If, instead of Water, there is an Evacuation of Glears, the Surgeon may be glad that he has preferred the Puncture of the Lancet to that of the *Trois-quarts*, because the Glears issue out better thro' the Puncture of the Lancet.

Having cleansed the Joint well, lay upon the Puncture a Pledget cover'd with Balsam of *Arceus*, and keep it on with a little Plaister of *Nuremburg*, or burnt Ceruse. The rest of the Part must be wrapt round with the Cataplasm prescribed above, it will be found very effectual in bringing the Patient to a perfect Cure. If a Tumour comes, the Patient must bleed, it is not necessary to stay still Accidents happen, 'tis better to prevent them. If the *Sinovia* becomes purulent, 'tis not sufficient to make a Puncture; one is obliged to make large Incisions on both Sides the Joints, for all this Maxim of some Practitioners, who say that the Joints must not be laid bare; these Parts are no more to be respected than the others, when there is a Necessity, I have known some Persons to observe this Maxim, let the *Pus* stagnate in the Joint, and draw out no more than what came

came from a fistulous opening: 'Tis a pernicious Practice; it is easily conceived that the *Pus*, which takes up its Residence in Places so sensible, can't but produce melancholy Symptoms; that Pains, Fevers, Vomiting and Looseness, irregular Shiverings, and a Reflux of purulent Matter into the Blood, must be the Consequences; and that Imposthumes in the Liver, the Lungs, and other Intrails, are the Diseases which must end those who have been so ill-managed,

Again, 'tis observed that the expulsive Dressings which are so beneficial in Practice, can not be made Use of to expel the *Pus* that remains in the Cavity of the Joint, besides the Parts give Way, and yield to the Compression, which is what forces out the *Pus*: Here, on the contrary, the Bones resist, and the *Pus* is shelter'd from the Compression in an infinite Number of Corners of the Joint. For this Reason, they must not only be opened, but there must be large Openings made, so that they may have Communication with each other, to the End that there may not be any Part nor Crevice of the Joint, but what may be cleansed by the Injections, and be discharged outwards with Ease by the Openings. I know that sometimes the Bones are corrupted, and one is obliged to make them exfoliate, but the Fault must not be laid upon the Incisions, the Continuance of the *Pus* there may be the Cause: 'Tis for this Reason that I advise the opening it in Time, and the giving the Matter a Bias by a proper Situation, as also the washing the Wound with the Injections, as has been said.

Exfoliation may be procured by taking exact Care that the Bones be not again covered with unsound Flesh, by often laying *Lapis infernalis*

to that which does appear, and applying an actual Cautery, or a Solution of Mercury and *Aqua Fortis*; this Remedy is very efficacious, as shall be observed in treating of *Exostoses*, and a *Caries*.

'Twould be now requisite to speak of the *Anchyloses* (or rather the Dispositions to this Distemper) which may be caused by the Pox, the Scurvy, or the King's-Evil; but as these three Causes are common to *Exostoses* and *Caries*, I will treat of this Matter in the second Part, when I shall explain the Formation of these two Diseases, and give an Account of the Means to cure them, which are the same, excepting the manual Operation of the Surgeon, whereof I have spoke amply in this Chapter.





A
TREATISE

OF THE

Diseases of the Bones.

PART II.

CHAP. I.

Of Fractures in General.

TH E Word *Fracture* is taken General- ly, Properly, and most Properly : Generally, for any Solution of the Continuity in the Bone ; Properly for a Solution of the Continuity that proceeds from an external Cause ; and most Properly, for a Solution of the Continuity that is caused by an Instrument that bruises.

Three
Accepta-
tions of
the
Word
Fracture

These Distinctions are made 1. To put a Difference between a *Caries* and a Solution from an external Cause. 2. To distinguish the Solutions proceeding from external Causes from each other, because these Words, *an Instrument that bruises*, make a Difference between a real Fracture, and a Wound in the Bone, made by a cutting or pricking Instrument.

To treat of Fractures in Order, we will follow as much as possible the Method we laid down in treating of Luxations; thus we have eight Things to know, which are

1. The Structure of the Part in general.
2. The Sorts of Fractures.
3. The unnatural Shape of the Limb.
4. The Cause of the Fracture.
5. The Signs.
6. The Accidents.
7. The Prognostick.
8. The Cure.

Structure

The Structure and natural State of the Limb is absolutely necessary to be known.

1. With Relation to the Bones.
2. With Regard to the Muscles.
3. With Respect to the Vessels.

With Relation to the Bones.

With Relation to the Bones, because there are some Parts where there are two Bones, and others where there is but one: Besides one must know the Solidity of the Bone, its Smoothness, or rather the Inequalities that are on its outside; all which Things, if not known, make one judge amiss of Fractures, and make the Surgeon fall into considerable Errors.

To the Muscles.

With Relation to the Muscles; there are some fractured Parts, round which are a great many Muscles, and others where there are but few, which 'tis requisite to know that one may judge of the various Displacings that happen

to the Bones, and the Strength that must be used to make the Extension and Counter-Extension.

With Regard to the Vessels, there are some near the broken Bones, of which one must not be ignorant, especially when one is to work upon complicated Fractures; and if one would prognosticate aright in those Cases where Accidents happen thro' the Compression, or hurting of the Blood Vessels or Nerves.

The several Sorts of Fractures are derived,

1. From the fractur'd Bone.
2. From the Shape of the fractur'd Bone.
3. From the Cause.
4. From the Distance of the broken Pieces.
5. From the Diseases or Accidents that attend it.

The Vessels.

The different Sorts.

Fractures may happen to hard or to spongy Bones; to long or short Bones, to thick or small ones: And both the one and the other may befall those of the Head, the Trunk and the Extremities.

Of the fractur'd Bone.

The Figure of the Fracture is different in almost all; some are oblique, others Cross-ways, and there are some where the Bones are, as it were, crush'd in Pieces.

Shape of fractur'd Bones.

The Fractures cross-ways are either unequal, or broken clean off, like a Radish without any Inequality. There are other Fractures where in one of the Ends of the broken Bone is shiver'd, forming, as it were, the Mouth of a Flute, or a Nail.

The oblique are of two Sorts, the one have their Obliquity the whole Length, others are broken transversally for some Lines, and the rest is oblique; 'tis also seen that the same Bone is fractured in several Places. It would be very hard to describe all the Figures of fra-

ctured

fractur'd Bones, I don't believe that ever there has been seen two alike.

As to the Fracture length-ways, I believe it imaginary, and fancy that they who have treated of it, have only spoken according to Authors whom they have misunderstood; for *Fabricius ab Aquapendente* has spoken of this Fracture in these

Opinion
of Fabri-
cius ab
Aquapen-
dente and
Galen.

Terms: " If the Fracture is the longway of
" the Bone, *Galen* says that there are two part-
" ticular Indications, the one to replace the
" abovementioned broken Bones, viz. to adapt
" the broken Parts to each other, and re-settle
" them in their Places; and the other to keep
" them in their right Proportion when re-ui-
" ted and adapted. He says that Extension is
" necessary to compass the first End, as also
" the middling Figure of the Joint, and pro-
" per Configuration of the Muscles, &c. And
" for the second End, which is to keep the
" Part entirely adapted, it is done by the
" Ligature, which as *Galen* teaches, &c.

Reflecti-
on

'Tis evident by what *Fabricius* says upon *Galen's* Authority, that both he and *Galen* meant by the Fracture longways, what we mean by the oblique Fracture; for altho' *Fabricius* says, in enumerating the different Sorts, that the Bones break cross-ways, obliquely and long-ways; he does not treat of the oblique Fracture, which makes it to be thought, that what he calls a Fracture long-ways, is only that which is most oblique, and that he intended to treat of the one in treating of the other, there being no essential Difference, but only in more or less Obliquity. In Effect, he would not propose making the Extension, because it is plain it is not proper; and he would not enjoin the adapting the Bones, because there is no displacing in a Fracture long-ways, supposing it cou'd hap-

happen. I say, supposing it cou'd happen, because there is no Blow which cou'd fracture the Bone length-ways, but what wou'd break it cross-ways with much more Ease; besides this, I have never seen it, and great Practitioners, who are Men of Credit, have assured me that they never met with an Instance of it but in Books. I know very well that Musquet Balls Remark. bruise the Bones, and split them long-ways, even within their Articulations; but 'tis not of these Sorts of Fractures that we have been speaking.

The Causes generally are all external; ne- Causes. vertheless, besides Blows and Falls, one may add, that there are occasional and internal Causes, which render the Bones more brittle, as is visibly seen in the Pox, the Scurvy, the King's-Evil, and the *Rachitis*.

As to the Distance of the Pieces of the Bones, the one are very distant, the others less, and others not all.

There are two Sorts of Displacings in fra- Of the ctured Bones, for the one may be displaced displa- lengthways, when the Ends are one above the cing of the other; and the other only in their Thickness, broken Bones. when they are separated, but not so but that some Part of the broken Surfaces touch each other.

There are some Fractures that are attended Diffe- with Luxations, Wounds, Imposthumes, Fe- rence in vers, Pain, Convulsions, or a Hemorrhage; and Respect others have no Symptom, wherefore we say to Acci- there are Simple, Compound, and complicated dents or Fractures. Diseases.

We call that a simple Fracture where there is Simple but one Bone broken, without any other Acci Fracture dent than what is usual in Fractures, and which only indicates one Thing for its Cure.

Some

Compound
Fracture.

Some are Compound, because at the same Time there are two or three Bones broken in the same Part, and they are not called complicated, because they only indicate one Thing for their Cure, which is the re-uniting them.

Complicated
Fracture.

That is term'd a complicated Fracture which is attended with the Diseases or Accidents beforementioned, which give different Indications, and require various Remedies and Operations to compleat their Cure.

Besides, a Fracture is called compleat when the Bone is entirely broken, and incompleat when there is still some Part of it whole; this is only met with in the Bones of the *Cranium*, those of the Hips, and the *Omoplata*; and if it sometimes happens to other Bones, it is only in very young Children, or such as have the Rickets.

Unnatural
Figure of
the broken
Limbs.

The third Thing necessary to be known in curing of Fractures, is the unnatural Figure of the broken Limb, which is different according to the fractur'd Part; it depends only upon the Situation and Force of the Muscles, as shall be observed in treating of particular Fractures.

The
Causes.

The fourth Thing to be known is the Causes; they are (as has been already said) all external, unless one adds to them a *Caries Exostosis*, Softness, and other Dispositions to render the Bones more brittle, whether in the Scurvy, the King's-Evil, the Pox, or the Rickets, which has been already said in speaking of the Difference of Fractures, with Respect to their Causes.

The fifth Thing to be known is the Signs, which are Rational or perceptible by the Senses.

The

The Rational serve particularly to discover Signs. the Fractures of the *Cranium*, whereof we shall not speak in this Treatise.

The Signs perceptible by the Senses are equivocal and univocal; the Equivocal are Pain, and the Impotence of the Limb.

Pain is an equivocal Sign, 'tis known that the same Cause of Pain produces different Effects, according to the Subjects; whence what is an insupportable Pain to some, is but very slight to others less susceptible; besides, we see Fractures without Pain, and we see great Pain without Fractures. Equivo- cal Signs.

The Difficulty of moving the Part is also an equivocal Sign in Fractures, because it is met with in all Contusions; and besides the Difficulty of moving proceeds from this; most part of Persons susceptible of Pain dare not stir for Fear of the Anguish. Equivo- cal Sign.

The univocal Signs are discover'd, some by the Sight, others by the Hearing, and others again by the Touch. 3 Sorts of Signs.

By the Sight, in comparing the sound Part with that which is affected, whereby we may better perceive its Deformity. The Sight.

In which, however, it must be observed, that the Parts on the right Side are not always conformable to those of the left, that the Eyes themselves are not always alike: Some Persons have been mistaken for want of asking the Patients, Assistants, Relations, Fathers or Mothers, if the Deformity that appeared was not of long standing, or even from the Birth. Observa- tion.

By the Touch, when one feels the Inequalities caused by the displaced Bones: In this three Things must be observed. First, that the Patient be situated in the Place where he must stay during the Cure, and consequently where the Remark.

the Reduction of the Fracture must be made. It is unnecessary, and even dangerous to make Tryals to judge of the Fracture, before he be in this Position.

Remark. Secondly, that he be held by some strong Person, to the End that, if he is put to any Pain in the Examination one is obliged to make to judge of the Fracture, he may be well restrained; for the Anguish sometimes forces a Man to make such Motions, as without Doubt, would be very prejudicial on this Occasion.

Remark. Thirdly, To feel to Purpose, and not cause unprofitable Pains, one must choose the Places where the broken Bone is least cover'd with Muscles, following the Surfaces or the Excrescencies of the Bones; and if there are any sharp Ends or Splinters, they must be touch'd very gently, that one may not push the sensible Parts against the Points or Edges of the Bones.

The Hearing. Fractures are discover'd by the Ear, when the Noise is heard that the Bones make, which is called *Crepitation*. To cause this *Crepitation*, one of the Ends of the broken Bone must grate against the other, which happens by moving the Limb; but, to make this necessary Experiment with less Pain, the upper Part of the fractur'd Limb must be held, so as it may not stir, to the End that in moving the lower Part gently, it may be touch'd by it, and occasion the Noise that is called *Crepitation*.

Remark. Observe that this grating which causes the *Crepitation*, may be only perceived by the Surgeon, and him that holds the upper Part, because it is not requisite that the outward Air should be moved to such a Degree as to strike the Ears; it is sufficient that their Hands
are

are mov'd by the Shock or grating of the fractur'd Bones.

It must also be observed that the Limbs are sometimes so broken in Pieces, that they are known at Sight, so great is their Deformity; in which Case the first Touch ought to be to make the Reduction, it may even be made before the Dressings are got ready, if the Case is pressing. It is unnecessary, and even prejudicial to make Motions to observe the *Crepitation*, since we are certain by other Means that there is a Fracture.

I shall observe *en passant*, that the *Crepitation* Observation is equivocal, and sometimes deceitful. I was one Day sent for to assist a Person that had fallen; I came later than a Bone-Setter, whom I found preparing the Dressings for a Fracture of the *Rotula*: Whilst he was so employ'd, I touch'd the Patient's Knee, and not discovering any Fracture, I call'd the Bone-Setter, and ask'd him by what he judg'd that the *Rotula* was fractured. He answer'd with an assuming Air, *Sir, don't you perceive the Crepitation?* No, Said I: He took the Knee, and moving it violently made the Articulations grate, telling me that I might hear it; I hear a *Cliquetis*, replied I, but not a *Crepitation*. He would maintain his Ignorance or his Knavery; but for all his sharp and gross Speeches, which would have affronted me from the Mouth of any other, I chose Moderation, and favour'd him so much as only to accuse him of Ignorance, which perhaps was not his greatest Fault. In Effect, can the *Crepitation* be taken for a Sign of the *Rotula's* being broken? 'Tis, perhaps, the only Fracture where it can't happen, because the Pieces of Bone must touch to make a Noise; and in the Fracture of the *Rotula*, the upper

Remark.

upper Part is always distant from the lower, by the Attraction of the Muscles which draw it upwards.

But, perhaps, some will ask me, whence came the Noise of the Articulation, upon the violent Motion made by the Bone-Setter? I answer, that it is usual when the Joints have suffer'd, and that 'tis more or less perceivable, because the Ligaments are swell'd and shortened, and draw the Bones nearer each other, the *Sinovia* is dispers'd; and 'tis known that the Reason of the Bones rubbing against each other without Noise is, because this Liquor, which lubricates the Cartilages, flows between them.

Another
Remark.

Observation.

It must be again remark'd, that when the Bones, tho' fractur'd, have retain'd their Evenness, the Deformity, if there is any, cannot proceed from the displacing of the Bones; therefore this Sign is not infallible. I have known a Bone-Setter sent for to the taking off the first Dressing of a Fracture of the Leg, which had been so perfectly reduced by one of my Brethren, that the Bone-Setter thought there was no Fracture; he had the Impudence to tell the Parents of the Patient so, and persuaded them to it. He took off the Dressing, and gave the wounded Person Leave to get out of Bed, which he did, but had hardly set Foot to Ground before the Bones were displaced, whereupon the Bone-Setter was turn'd off, and the usual Surgeon was again sent for, who was very much surprized at what had passed; I don't know whether, as Devout as he was, it did not sensibly please him to see the Impostor and the Incredulous so punish'd.

The Accidents of
Fractures

The sixth Thing to be known in curing of Fractures, is the Accidents: There are a great Number; the chief are, Pain, an Incapacity of

of moving the Part, a *Pruritus*, an Inflammation, a Fever, a Gangrene, a *Hemorrhage*, Convulsions, the Palsy, an *Atrophy*, Crookedness, an *Anchylosis*, and the Deformity of the *Callus*.

1. The Pain is caused by the Solution of the Continuity, and the twitching caused by the broken Bones in the neighbouring Parts; and this Pain is greater when the Tendons, Nerves, Membranes, or Ligaments suffer.

2. 'Tis not to be wonder'd at if the Limb be Pain. impotent, because its Strength depends upon the Muscles being supported by the Bones, which being broke, can no longer help them: Besides, Motion creates Pain, and the Patient keeps still for Fear of increasing that he has already, whence he remains quiet, more from a Fear of suffering, than want of Power to stir.

3. Sometimes a *Pruritus* or Itching seizes up- Of the on the fractur'd Parts, thro' the Surgeon's *Pruritus*. Fault, in using unctuous Medicines that stop the Pores, hinder insensible Perspiration, and keep in the Matter of the *Glandes Miliare*s of the Skin, and of the *Sebacea*; this Matter turns sower, and irritates the nervous Fibres of the reticular Texture of the Skin, which causes little Pimples, or *Herpes Miliare*s that are sometimes followed by an *Erysipelas* by the Continuance of the Irritation, and often an Impo-
sthume happens, if the Tumour seizes on the whole Thickness of the Tegument, because that in a little Time the *Corpus Adiposum* will suffer, and become the Seat of Impo-
sthumes.

4. The Fever proceeds from the Pain caused by the Points of the Bones, or from their hurtful Situation, with Regard to the Parts adjoining, which are very sensible; or else from the Disquiet of the Patient, on Account of other Passions wherewith his Mind may be agitated,

tated, all these Causes being capable of putting the animal Spirits, and the Blood, in an immoderate Motion.

5. The Gangrene is the Consequence of the Inflammation and swelling, which not being to be asswaged, wholly obstruct the Motion of the Liquors, whence follows Corruption, and the Death of the Patient; which also happens by the Rupture or the Compression of the Vessels.

6. The *Hemorrhage* is caused by the Solution of the Continuity of the Vessels, occasioned by the Points or Splinters of the Bones.

7. Convulsions happen thro' the Compression of the Nerves or Tendons, or else thro' their being prick'd by the Points of the Bones, or some Splinters that are separated from them.

8. The Palsy which comes at first, is the Effect of the violent Compression of the Nerves, and that which happens afterwards, proceeds from Defluxions that fall along the Progress of the Nerves.

9. The *Atrophy*, or falling away of the Part, is not an Accident that happens at the Beginning, but in Process of Time, thro' the weakening of the Nerves and Arteries, which continue compress'd; or else by Reason of the Bandage's being too long bound, together with the Disposition of the Subject.

10. The Crookedness is caused by the Reduction's having been ill made, or by the Patient's not having kept himself in the Position that was enjoined him.

11. The *Anchylosis* comes when the Fracture is near the Joint, and the nutritive Juice or callous Matter has spread in the Neighbourhood of the Ligaments, where it coagulates, and folders (to use that Expression) the Bones in their Jointings: Or else it sometimes happens

pens thro' the Person's continuing a long Time in the same Posture without moving, whence the *Sinovia* thickens, and produces the same Effect as the nutritive Juice beforementioned.

12. The *Callus* is misshapen from its not having been sufficiently restrain'd by the Bandage, or because the Bones have not been well reduced.

Oftentimes 'tis not possible to restrain the growing of the *Callus*, especially when the Pain, Inflammation, and other Accidents prohibit the using a tight Bandage; but it often happens that the Surgeon himself is in Fault, when without any Reason he does not bind the Bandage sufficiently: In this Case the nutritive Juice, that must solder the Bones is not confined; then the Bandage must be put on in such a Manner as it may sufficiently and equally compress the Bones, to the End that the Juice may not have an Opportunity to diffuse it self in the Neighbourhood; and 'tis for this Reason that it appears more misshapen in the Fractures, where the Bones have not been well placed; both because the Bones which lie one upon the other, occasion an external Deformity; and because the Bandage can't compress equally, nor produce the Effect of which we have been speaking.

The seventh Thing necessary to be known in ^{Prognostick} managing Fractures, is the Prognostick that is drawn from the different Kinds, and according to that we will say that the oblique Fractures, and those which are like a Nail, or the Mouth of a Flute, as also those that are broken into several Pieces, are more fatal than the Fractures Cross-ways.

They which proceed only from external Cases without any internal Defect, are less

dangerous than those where the Bones have been render'd more brittle by the Scurvy, the Pox, the King's-Evil, or the Rickets. In all these Cases the bony Juice is not well conditioned, and (far from yielding a Substance capable of hardening, and forming a *Callus*) it destroys the Substance of the Bone it self, and corrupts it, instead of soldering and uniting it.

When the two Bones of one and the same Part are fractured, the Fracture is more dangerous than when there is but one: If the displacing is considerable, the Fracture is harder to cure, than if it is moderate, or there is none at all. If any Accidents happen, the simple Fracture, being turn'd complicate, becomes more dangerous.

The Cure
of Fra-
ctures.

The 8th Thing to be known is the Method of Cure, wherein Regard must be had to three Intentions, which are, to reduce the broken Bones, to support them when reduced, and to correct the present, or prevent future Accidents. There are some who add a 4th, that is to labour at the Formation of the *Callus*.

First In-
tention.

The first Intention comprehends three Things, viz. Extension, Counter-Extension and Conformation. To make these; first, the Patient must, as near as possible, be situated in the same Place and Position wherein he must remain during the whole Cure.

2. The Ends of the fractured Bone must be drawn with the same Degree of Strength.

3. The Force that draws must, as near as possible, be applied to the two Ends of the broken Bone, and never to Parts that are near it.

4. In putting on the Straps, or placing the Hands that draw, one must remove a little from the fractur'd Part, and choose those Pla-

cess

ces where the Hands and Straps have best hold, as near the *Condyles*, and the Parts where the Limbs being smallest are easiest to pass, because these Eminences may with-hold the Hands or Straps, and hinder them from slipping, which gives them better hold.

5. The Extensions must be proportionable to the Distance or displacing of the Pieces of the broken Bone, and to the Force of the Muscles that cause the displacing, and resist the Extension.

6. The Muscles must (as much as possible) be in a State of Inaction, because that otherwise, to get the better of them, one runs the Hazard of tearing or breaking them, as has been often seen, for want of Precaution.

7. It must be made by Degrees, for fear of ruining the Muscles, which would happen if one was to pull forcibly of a sudden, forasmuch as 'tis requisite to give the musculous Fibres time to yield to the Strength that extends them.

The Way of making these two Operations is, With the Hands, Straps, and sometimes with Instruments or Machines.

The Hands only are to be used when the Limbs may be easily grasped, and when the Muscles have no considerable Force.

On the contrary Straps are used, when the Hands can't grasp the Part, nor have Strength enough to master the Power of the Muscles.

Lastly, Machines are used when neither the Hands or Straps are sufficient, whether in Respect to their Force, or their Application.

To make the Conformation. 1. The Extension and Counter-Extension must be sufficient. The Use of these is to remedy the displacing of the Bones which happens long-ways, when they on.

they lie one upon the other. Now it is impossible to make them conformable whilst their Sides touch each other, therefore they must be drawn upwards and downwards before their Conformation.

2. The Conformation may be made with the Palm of the Hand, the fleshy Part of the Thumb, or the Fingers; sometimes even with Instruments, as the Trepan, the Elevatory, and others, and that according to the respective Cases.

3. The Force that tends to replace the Bones must, as near as possible, be so placed as not to work upon their Ends, or their Splinters, to the End that one may avoid a Solution of the Continuity, and Divulsions, that would cause fatal Accidents.

4. The Strength that is employed in adapting and replacing the Bones, must be proportionable to the Solidity of the Bone, the Thickness of the Flesh, and how far it is displaced, as to its Thickness.

To the Solidity of the Bone, because Bones that are thin resisting less than thick ones, there is less Strength requisite to replace them.

To the Thickness of the Flesh, because if it is thick, the Force is more distant from the Bone, and has less Effect.

The
Manner
of keep-
ing the
Bone in
its right
Position.
What
must be
done in
dressing
of Fra-
ctures.

The second Intention in the Cure of Fractures, is to support the reduced Bone, which is done by the Dressings and Position of the Part, wherein all that follows must be observed.

1. The Dressings consist of Compresses, Bands, Splints, Pastboards, Cases, Straps, Junks, Scarves, Pellets, Medicines, and others, according as is requisite, in the Application of which, one must observe, 1. That the Hair be shaved.

2. That the Part and the Muscles be in their Restitude or Situation.

3. That

3. That they who hold the Part whilst the Dressing is putting on, be strong, and that they be as little constrained as possible, that they may hold it equally till the End of the Operation.

4. That the first Compress be single, to the End that the Band may be more easily applied, and may be nearer the Part it is to bind and keep in.

5. That the Bands be moderately fine, cut to a Thread, and of Linnen that has been a little worn; that they be sufficiently long and broad; that the first be clapt on immediately upon the fractur'd Place, as near as possible, that it makes three Rounds, and goes upwards, ending in Circumvolutions that must be neither too tight, nor too slack; not too tight, for fear of hindering the Circulation; nor too slack, because it won't keep in the fractured Bones.

6. The second Roller ought to have the same Qualities as the first; it begins at the same Place, it is continued downwards, and remounts upwards, according to the Cases, the Sorts of Fractures, and the different Bones that are broken.

7. The Splints must only be thick Compresses, after the Manner of longitudinal Bolsters, they must be laid on along the Part, in those Places where there is no Eminence nor Excrescency of the Bone; formerly they were made of Pastboard, cover'd with a thick Cloath that they might not hurt.

8. There must sometimes be Compresses to equalize the Parts, that the third Band, and the Pastboards may make an equal Compression. There are some Parts more sunk in than others, and these Compresses serve to fill them

up, which makes the whole Part upon a Level, and renders the Application of the Rollers more exact.

9. The Pastboards ought to be cut in Proportion to the Size and Shape of the Part; they are fastened with two or three Straps. One begins to tye them at the lowermost, if there are but two Straps, or at the middle if there are three. The Number is determined by the Length and Compass of the Part.

Position
of the
Part.

For the
lower
Extremi-
ties.

After the Application of the Dressings, one must place the Body and the Part affected: The Position of the whole Body is different, according to the various Parts that are fractured. In all Fractures of the lower Extremities, and those of the Hip-Bones, the Patient must absolutely be in Bed till the Formation of the *Callus*; he must do the same in all other Fractures, till the Pain, the Fever, and other Accidents are over, after which he may be taken up, at first only to make his Bed, and afterwards he may be left more or less in an easy Chair to refresh himself.

For the
Arm.
For the
Leg.

If 'tis the Arm or the Fore-Arm, it must be hung in a Scarf; if the Leg, it must be placed quite extended in Junks, or in a Case; and in both the one and the other the three Conditions must be observed, whereof we have treated amply in the Account of Luxations in general, and which are reducible to three Things, *viz.* that the Part be placed high, soft, and steady.

It must be high, that the Juices being assisted by a Bias, may circulate the more easily.

Soft, that the Part may not be hurt, nor the Patient have any Reason to stir.

Steady,

Steady, because the Re-union can't be made, when the Part is upon a Place that shakes and is unsteady.

The third Intention in the Cure of Fractures, is to correct, or prevent Accidents; to compass this, and not be surprized, the Surgeon must visit the Patient very often, and examine the Parts next the fractured Limb, as the Foot, if 'tis the Leg, the Hand, if the Arm, that he may be assured of what passes in Respect to the Bandage, for those are the Places where its Perfection or Imperfection is discovered. It is ^{Perfection} as it should be, if one finds a soft, red Tumour, ^{ons of} of a temperate Heat, and without Pain. If ^{the Ban-} the Bandage be too loose this Tumour won't ^{dage.} appear, and 'tis a Sign that, far from being tight enough to support the Bones, it is not sufficient to compress the Blood Vessels moderately, for this Compression is the Cause of the Tumour that appears when the Bandage is tight enough.

In fine, when there appears a hard black and cold Swelling, 'tis a Sign that the Bandage is too hard bound, in these two last Cases the Dressing must be taken off, to be put on better. ^{What must be done.}

A very exact *Regimen* must be prescribed if ^{Regimen} the Fracture be considerable, and attended with any melancholy Accidents.

The first Dressing is taken off sooner or later, according as there is need, which is known by the Accidents; for when there happens to be Pains, Swellings, Inflammations, and others, one is obliged to take off the Dressing to clap on another immediately; otherwise 'tis left on longer, 'till the eighth Day, if no Accident appears, and even if there was no Swelling at the Time of making the Reduction, and putting on the Dressings. For the Dressing is forced

forced to be taken off sooner than one would otherwise, (altho' no accident appear) when the Tumour is considerable at the Time of applying the first Bandage, and it abates so that the Bandage often becomes too loose the next Morning.

Precautions to be observed in taking off the 2d. Dressing. Corrections of Accidents. Pain.

In taking off the second Dressing, the same Precautions must be observed as before, and it must be put on the same Way, binding it a little harder if the Swelling is gone off.

The Accidents are to be corrected after the following Manner: If the Patient feels any Pain, 'tis not usually at the Place of the Fracture, especially when the Bones are reduced.

Therefore he is relieved by loosening the Straps, the Junks, or the Scarf; by raising or lowering some Cushions, by applying hot Cloths, and making some Fomentation, for this Pain often proceeds from some very Trifle; other Times it continues, and obliges us to take off all the Dressing: One is even forced to use Bleeding and Narcoticks, to cure and mitigate it when 'tis violent.

Itching.

The *Pruritus* is prevented by not using unctuous Remedies, that are capable of closing the Pores. It is taken away by Lotions of Spirit of Wine, and warm Water, and other watery and spirituous Fomentations, and by using clean Linnen wash'd in Lye, for Neatness is essential in dressing of Fractures.

Inflammation.

The Inflammation is cured by speedy, plentiful and re-iterated Bleeding, by a mild moist Regimen, a strict Diet, and bitter Broths; or the refined Juices of Bugloss, Burrage and Succory, whereunto must be added, according to the Cases, 15 Grains of Nitre into every Dose of 3 or 4 Ounces, which the Patient must take during the Interval of his Broths.

His

His Drink must be a light Ptisan of Dog's Grass, and Succory Root, and in each Pint which the Patient drinks in a Day, during the Interval of his Broths, he must dissolve a Dram of well purified Nitre.

The Fever is only the Effect of the Inflammation, or Pain, wherefore 'tis cured by the Remedies that will put a Stop to the one, or mitigate the other.

If a Disposition to a Gangrene appears, one must abandon the Bandage just described, and make use of that with 18 Tails. One must apply the Fomentations fit to resist Putrefaction, as Spirit of Wine camphorated, *Sal. Marine* and *Armoniac*, Ashes of Vine Branches; the Tinctures of Myrrhe, Aloes, and long and round *Aristolochia*, are also very good.

If the *Gangrene* increases, Scarifications, Incisions, and Cuttings must be made, as need requires; and if the Disease give not Way to all these Means, the Limb must be cut off. See what has been said of the Gangrene in the Chapter of the Luxation of the *Vertebrae*.

The *Hemorrhage* is generally found only in Fractures where there are Wounds; nevertheless I have seen the Artery that passes between the two Bones of the Leg, opened by the Edge of a Fracture of the *Tibia* that was broken in the Shape of the Mouth of a Flute, an *Echymosis* spread all over the Leg, and the Part became cold and blackish; 'twas thought to be gangrened, I open'd the Leg from 4 Fingers Breadth above to as many below the Fracture, and made an Incision as far as, and beyond, the Interossal Ligaments, and stopped the Flux without displacing the Bones; I managed this Disease like a complicated Fracture, as it was, and cured my Patient.

Ways to
stop the
Hemor-
rhage.

It must absolutely be laid bare, to stop an open'd Vessel, that one may compress, bind, or apply Strypticks to it, which are the three Means to stop extraordinary Bleedings.

Ways to
cure the
Convulsi-
ons.

The Convulsions don't continue long, because they are generally caused by the Points of the Splinters that prick the Nerves or nervous Parts, and these Parts are no longer prick'd when the Reduction is made.

Nevertheless there will remain Startings that may be prejudicial when violent; they are allay'd by Bleeding, and the Juices of bitter Plants, with some Grains of dissolved Nitre. When they are yet more violent, add, to these Apozems, some Grains of *Pulvis de Gutte*, and at Night they render them hypnotick by Syrup of *Diacodium*, or the sedative Salt of Mr. *Homburg*.

The Pal-
sy.

The Palsy of the Limb, and its *Atrophy* or Leanness, are cured by Frictions with hot Cloaths, and by spiritous Fomentations that are proper to give Motion to the Blood and Spirits; and as this is not discovered till after the Cure of the fractured Bone, it being solid, one may put the whole Part in the Dregs of Wine or Beer: The Waters of *Bourbon*, *Bourbonne*, and their Mud are also very good.

Anchylo-
sis.

The *Anchylosis* is incurable when the nutritive Juice has taken Possession of the Joint, and is coagulated there; but that which proceeds from not moving the Part, and not dispersing the *Sinovia*, is to be managed as has been said in the Luxations, and the Treatise of the *Anchylosis*.

The Cal-
lus.

As to the Deformity of the *Callus*, there is no Remedy when once 'tis formed; this Imperfection is only to be prevented by making a proper Bandage in the Beginning, provided the
Bones

Bones are well reduced, and nothing hinders the using the ordinary Bandage.

The Formation of the *Callus* is as easy to be conceived, as that of a Scar, being, both the one and the other, the Means whereof Nature and Art make use to rejoin those Parts which have suffer'd a Solution of their Continuity. Formati-
on of the
Callus.

In order to comprehend well the Formation of the *Callus*, one need only call to Mind the Idea of the Structure of the Bone, and the Mechanism which Nature uses to nourish it: 'Twill be known that by the Means of the *Periosteum* the Blood is carried into the Body of the Bone by an innumerable Number of little Arteries, which enter by as many little Holes, and penetrate the Bony Substance, to supply it with a saline and sulphurous Juice that introduces it self into the Channel of bony Fibres, to repair their Wasting: The superfluous Part of this Piece is taken back by the Lymphatick Vessels, and that of the Blood by the Veins; both the one and the other are carried to the Heart by the Circulation: This being so, 'tis easily conceived that this *Lympha*, which is supplied by the Arteries, and runs into the Pipes of the long Fibres, diffuses it self thro' those that are broken, at the Place of the Fracture; and because it don't flow in great Quantity, it congeals at their Ends, when it is naturally, that is, impregnated with saline and sulphurous Principles, which are the Principles of the Juice that are properest to congeal, as we shall observe in the Treatise of the *Rachitis*. And to explain how the Circulation is made in this new Part, I say that the first Drop of the *Lympha*, that flows from each bony Conduit, is thrust forwards by the second, which divides it to open it self a Passage, and is afterwards it self

self divided by a third, and the 3d by a 4th, which by a little and little fills up the *Vacuum*, and forms a Pipe thro' which the 5th, and so on *ad Infinitum*, preserve themselves a Passage to introduce themselves into the empty Spaces, and fill them up. This being thus continued, till these congealed Particles have Strength enough to withstand a new Separation; and the Circumference is sufficiently fortified that the Liquor can no longer diffuse it self upon the Sides, and being obliged to follow its Motion in a right Line, enters into Part of the Pipe that is in the other Part of the broken Bone, where it finds the Vessels disposed after the same Manner; and so the Circulation begins again in this new Part.

C H A P. II.

Of the Fracture of the Nose.

Structure **T**H E upper Part of the Nose is formed by two little Bones, which joining themselves together form a Sort of Arch very proper to withstand external Blows, and which resist so much the better, because they are supported by the bony *Lamina* of the *Ethmoides*; nevertheless there are Blows capable of beating them in, and breaking them different Ways.

Causes. For Instance, if a Stick, a Stone, or any other Body strike the two Bones of the Nose upon the Line described by the bony *Lamina* that sustains them; or if one fall upon some hard Body that hits the two Bones upon the same Line, a Fracture may happen both to the bony *Lamina* and the Nose-Bones. Nevertheless
 'tis

'tis more usual for one of the two Bones to break, and the other only to sink in, especially in those the Top of whose Nose is flat.

But there must be a Fracture of the bony *Lamina*, provided, as has been said, the Blow be given upon the Union of the two Bones, and on the Line described by this *Lamina*, altho' there should be but one of the Bones fractured, and the other sunk in.

This Fracture is with or without Wound; Kinds. with a Wound inwards and outwards at the same Time, or on one Side only.

It is easy to know the Fracture if there be Signs. no swelling, but there often is, which hinders our discovering it.

It is not generally fatal; the violent Strokes Prognostick. and Falls upon the Nose that are without Fracture, are sometimes much more dangerous, because if the bony *Lamina* resists without fracturing, it causes a Commotion in the Brain: Several Patients have died of Abscesses in the Observation. foremost Lobes, and an Effusion under the *Dura Mater* which covers the *Os Coronale* and *Cribriformum*.

Sometimes Imposthumes are formed within the Nose, between the pituitary Membrane and the Bones, these require a particular Cure.

Mr. Sauret called me in one Day to a Consul- Observation. tation upon the Distemper of one of his Neighbours, who had a little Wound in the Nose, at the Place where the Bones and the Cartilages are join'd together; the Bone was bare, and there came from the Wound a Spoonful of Pus at every Dressing: We pressed the outside of the Nose, and the Parts next to it, without getting out the least Drop of Pus. I put my Finger up the Nostril, and felt a soft Tumour that dispersed in Proportion as I made the Pus issue

issue thro' the exterior Opening by compressing it.

I thrust in a hollow Probe, fit to make the Operation of the *Fistula in Ano*; I carried it into the purulent Bag till I felt it with the Finger that I had in the Nose, I pierced the pituitary Membrane, and by the Help of the channelling of the Probe, I made an Incision therein with a *Bistouri* six Lines wide; there came out again a great deal of Pus; I ran a *Seton* from the outside of the Nose into the inside, which I took away three Days afterwards, and the Patient was cured in a little while.

Observation.

M. *Ruffel* my Brother Member shew'd me a like Case a few Days afterwards, the same Course was taken, and 'twas not long before the Patient was cured.

Observation.

I had practised this Operation in two Cases a little different from these two. One was the Consequence of a *Fistula Lachrymalis*, accompanied with an Imposthume, which extending it self along the Nose, form'd a little soft Tumour in the inside of the Nostril, which I pressed, and which discharged it self into the Hole of the *Fistula Lachrymalis*; it was proposed to make an Incision from the *Fistula* to the Bottom of the Imposthume, but, to avoid disfiguring the Face, I advised opening it on the inside of the Nostril: I did it, and the Abscess was dried up in 24 Hours, and the Patient cured in a few Days after.

Observation.

The other was an Imposthume, which was the Consequence of a Blow upon the Nose, and had formed it self both on the out and inside; so that when it was press'd without, the Tumour on that Side diminished, and that within increased; and when it was press'd on the inside, the internal Swelling abated, and that with-

without grew larger : 'Twas deliberated on which Side to open it, but 'twas agreed that it ought to be done internally, to avoid the Disfigurement, and that if Necessity required the Opening it outwards, it would be Time enough to do it. Wherefore I opened the Abscess inwardly, I introduced a Tent, which was supported by a Stopple of Lint, and by a Bandage outwards ; I applied Lint steeped in the White of an Egg beat up with Allum, and a Bolster and Bandage to compress it. There came again out a good deal of Pus at the taking off the first dressing, at the second there appeared less, and yet less at the third ; and by little and little the Patient was cured in 8 Days, Speedy
Cure. without any Thing's being seen on the outside of the Nose, at the Place where the Fluctuation was so apparent, that it might have determined us to open it on that Side, sooner than on the other. I don't give the Reason of these Facts, they speak enough of themselves ; what has been said proves that the Fracture of the Nose is not always without Danger.

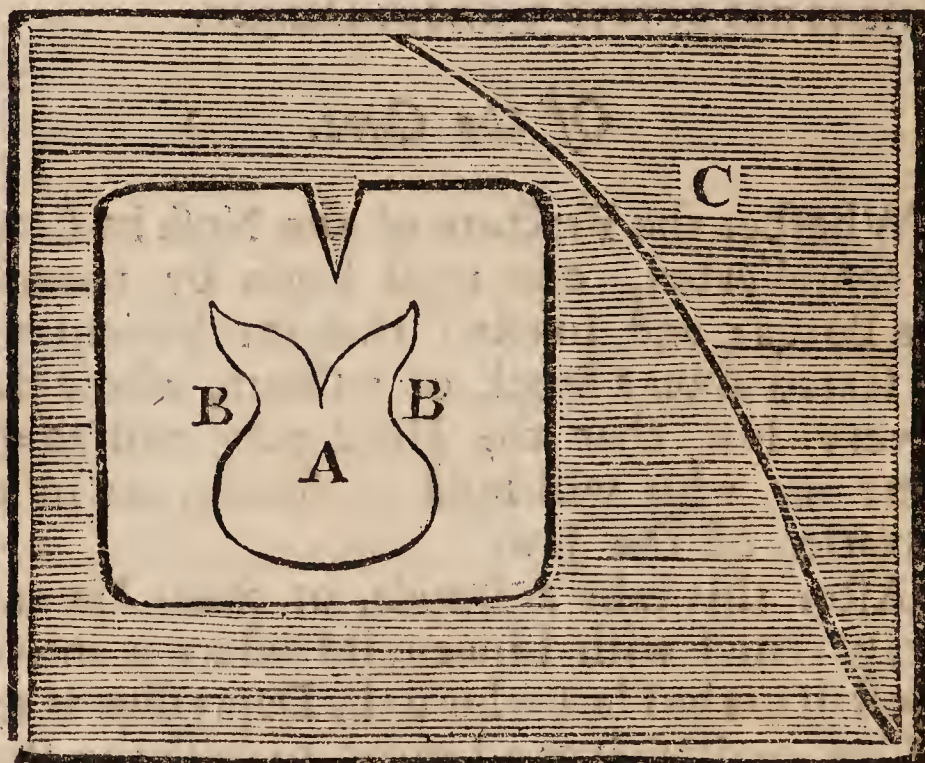
Of the Cure.

Whether the Fracture of the Nose be simple Reducti- or complicated, one must begin by reducing on the Bones ; and to effect that the Patient must be seated upon a Stool, or a Chair, whose Back is very low, that the Head may rest against some one who will hold it steady, as in the Luxation of the Jaw.

After this take a *Spatula*, or Steel *Elevatory*, Manual wrapround with Linnen, introduce it into the Operati- Nostril to the Place where the Depression is most on- visible, and use it as a Leaver to raise the Bones that are driven in or broken, without Fear of hurting.

hurting the pituitary Membrane, or thrusting the Bones too much outwards, because the Hand that don't hold the *Elevator*, but touches the outside of the Nose, is the Director of this Motion, and is attentive (if I may use that Expression) to what passes.

If this Effort of the *Elevator* don't raise both Sides at once, which ought nevertheless to happen; one must pass it into the other Nostril, and do as has been just said; then thrusting Stopples into the Nose steeped in vulnerary Water, or in good Brandy; cover the outside with a Compress (A) dipt in the same Liquor; put on another (BB) which covers the Nose, the Eyes, and the Forehead: The whole is kept on by a Handkerchief (C) negligently fastened that it may not compress the Nose, nor particularly the Eyes. The Stopples of Lint that are put up the Nose must not be covered nor made fast, because they may be renewed by others steeped and applied in the same Manner.



These Stopples serve only to keep on the Medicines.

They who devised the putting Linnen Stop-
ples to sustain the Bones, least they should dis-
place themselves, have never reduced any Fra-
cture of the Nose, or they would have learnt
that it requires more Force to drive in these
Bones that are just replaced, than was neces-
sary to use in raising them with the Elevatory;
Things being thus, the Quills to help the Pati-
ent's breathing, are equally unprofitable, and
I even believe the Stopples must be hurtful. I
never used them dipt in vulnerary Water, but
as Topicks proper to comfort the Parts that
have been griev'd by the Blow, or the *Spatula*
that made the Reduction: For this Reason they
ought to be very soft, and be left off as soon as
the Pain ceases.

Remark.

If there be a Wound with the Fracture, it
must be dress'd when the Reduction is made;
one must bring the Lips near each other, and
keep them so with little Compresses supported
by the rest of the Dressing, as has been said.

Compli-
cated
Fracture

Bleeding, a Diet, Rest, in a Word, a due
Regimen and the general Remedies are not to be
neglected, especially if there be a Pain in the
Head, bleeding in the Nose, Heaviness, and
other Symptoms, which may be the Effects of
a Commotion.

R

CHAP.

C H A P. III.

Of the Fracture of the Lower Jaw.

Remark.

THE Lower Jaw is more difficult to break than a great many other Bones, because its Articulations deaden a Part of the Shock that Blows or Falls may give it; besides the Teeth which are set in it partake of the Shock, and when, by Strokes or Falls they are thrust against the upper Jaw, the Teeth of the one meeting with those of the other, communicate the Motions to each other, which takes off so much of the Force that acts upon the Jaw, to break it.

Remark.

The broken Pieces separate but a little, sometimes not at all; and if there is any displacing from above downwards, because there are no Muscles that draw the Ends of the fractur'd Bones over each other, 'tis always the Fore-Part that sinks by Reason of its Weight, and the hind Part that is raised by the Influence of the *Masseter*; the *Pterygoideus internus*, and the *Crotaphitis*: Thus the displacing is not considerable, unless it be made by the Violence of the Blow, which continuing after the Fracture, separates the Pieces from each other.

The Signs.

The Fracture of the Jaw is known by putting ones Hand into the Mouth, the Teeth of one Part will be found not to be in the same Line with those of the other; besides, one may perceive an Unevenness without, by running a Finger along the Basis of the Jaw; but this only happens when there is a Displacing.

When

When the Pieces of the Jaw that is broken are not displaced, 'tis hard to discover the Fracture. To be convinced of it, one must lean upon the Fore-Teeth, and thrust them downwards; and at the same Time push the Part of the Jaw that is near the Angle, and the *Crepitation* will be heard; but it is not material to know it, since there is then no Reduction to be made, and 'tis sufficient to keep the Jaw in that Position.

There are some Strokes and Falls so violent that the displacing causes a Deformity visible to the Eye, so that there is no need of feeling.

Prognostick.

The simple Fracture is not of ill Consequence, especially, when there is no displacing.

Fracture without displacing.

If the displacing were considerable, there would be more Danger, because the String of the Vessels that passes along its Canal, would be torn, broken, or stretched, which causes very sharp Pains, and may bring Convulsions, by Reason that this Nerve is one of the great Strings of the hinder Branch of the 5th Pair, which passes along the Canal of the Jaw, to supply the Teeth with Branches: There even happens a rushing in the Ear, because from the Trunk of this Nerve proceeds the little Branch that crosses the Skin of the Drum; and the Cheek seems benumbed, both by Reason of the Stroke, and because the little Nerve of the *Maxillary* that passes by the Drum, falls into the Trunk of the *Portio Dura*, which distributes itself thro' all the Cheek.

Fracture with displacing.

Besides 'tis known that the lower *Maxillary* has Communication with the *Portio Dura* co-

ming from the Canal of the Jaw near the Chin.

Acci-
dents.

Sometimes Convulsions, or convulsive Motions affect the Lips, and even other Parts, by Reason of the Communication of that Nerve of the 5th Pair with all the other Pairs of Nerves; the Eyes are inflamed by the same Cause. The *Saliva* flows in Abundance by the Compression of the Glands; and these Accidents are the more considerable, when the Jaw is broken nearer the Angle than the Chin.

Cf the Cure.

Reducti-
on of the
Fracture.

In reducing the Jaw when broken, one must observe of what Kind the displacing is: If 'tis in Thickness, 'tis easy to help it, by making the Conformation with the Thumb, which presses upon the Teeth, whilst the Hand runs along the Basis of the Jaw, to level the Inequalities; but if the Pieces of the Bone are got over one another, the Extension and Counter-Extension must be made, which does not seem easy.

Remark.

To compass this, one must trim the *Index* of one Hand, and the *Index* and *medius* of the other with Linnen; the Fore-Finger of the one being thrust into the Mouth beyond the farthest Tooth, must serve as a Buttress against the Root of the *Apophysis Coronoides*, and must thrust this Part backwards, whilst the two Fingers of the other Hand being placed under the Tongue, and the Thumb of the same Hand under the Chin, must draw the Fore-part of the Jaw forwards. These two contrary Motions will make the Extension and Counter-Extension, which will remedy the Displacing length-

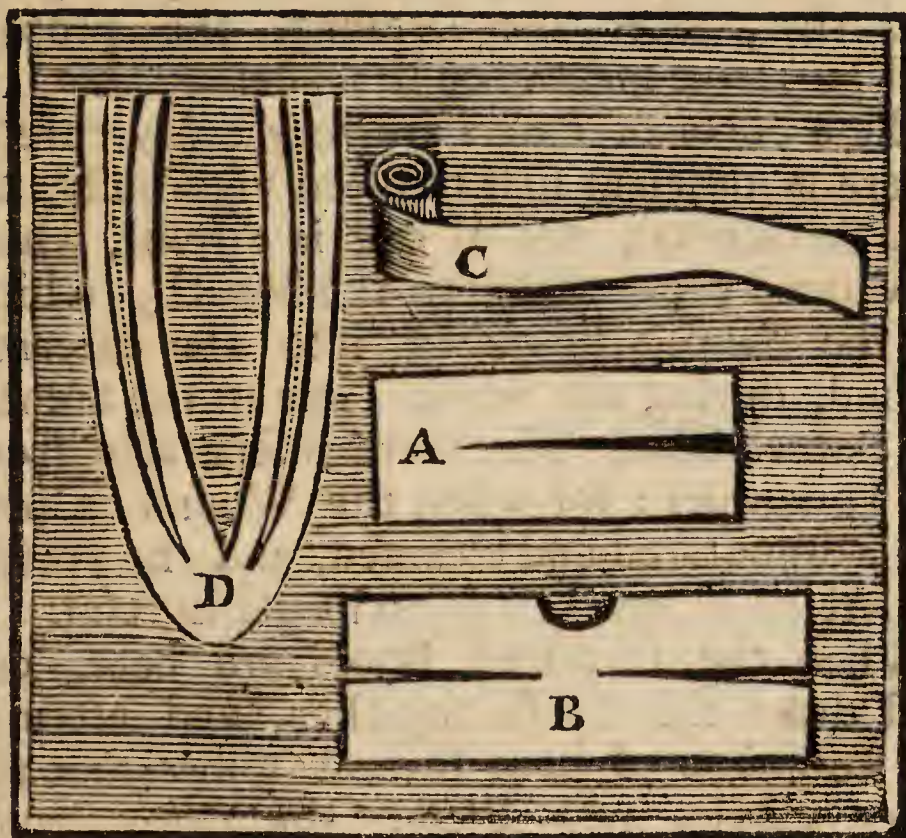
Remark.

length-ways, and then the Conformation will be made easily.

When it is done, the Lower Jaw must be brought near the Upper one, which will serve it as a Splint, provided it is sufficiently furnished with Teeth, and the Teeth answer exactly to each other; if not, it is necessary to fill up the empty Spaces with Compresses, to equalize them, to the End that the Support may be equal and sufficient. Remark.

The Reduction being made, the Compress Dressings. (A) must be laid upon the Part, steeped in Aromatick Brandy; after that a very thick Compress (B) supported by a Band (C) whereof the Bandage called *Chevestre* must be made, or else it must be sustained with the Sling, or Chin-Cloth (D.)

The Patient must neither speak nor read, nor must he be allowed the Use of any Thing but Broth, Jellies, and other liquid Food, which



won't oblige him to move the Jaw. One must also prescribe Bleeding, Potions, and other general Remedies.

Of the complicated Fracture of the Lower Jaw.

Fracture
with a
Wound.

The complicated Fracture of the Lower Jaw is not hard to dress, because one may take off the Dressings every Day without Fear of displacing the Bones: When they have once been replaced, they keep so; because there are no Muscles that act to separate them. Thus the Wound that accompanies this Fracture, does not require the Bandage with 18 Tails, nor one with a Hole, as some Authors have proposed: I have even dressed a great Number of Wounds by Musquet Shot, where the Jaw was not only broken, but had lost two Fingers Breadth of its Length, without ever being in Pain for its Displacing; it never happens provided that, after the Dressing, the proper Bandage above mentioned be made.

Observation.

These Sorts of Hurts are very easily cured, if Care is taken at first to bleed vigorously, to avoid Accidents; and if one is careful, when the Wound penetrates into the Mouth, to hinder the *Saliva's* spreading into the external Wound, during the whole Time of the Stench and Putrefaction, which are inseparable from this Distemper; for when the Wound is perfectly suppurated and cleansed, and the Spittle has lost its ill Smell, it is no longer hurtful.

Observation.

When the fractured Bones are bare, one must draw the Flesh together, and attempt the Re-union. I have several Times seen the Bones acquire new Flesh, the *Callus* form'd and

and the Wound cicatrize, without any Exfoliation's happening, more or less.

There was a Man who had received a Kick Observation. from a Horse that had been just shod, and the Edge of the Shoe cut the Flesh that covers the Jaw, near the Hole of the Chin; and glancing from this Hole towards the Angle of the Jaw, it laid open the Bone that whole Length, and broke it between the last Grinder and the *Apophysis Coronoides*; which according to all Appearance had not happened, if the Foot of the Horse, which till then had only glanced along the Bone, had not been stopp'd by the *Apophysis Coronoides* of the Jaw.

I made the Reduction, cover'd the Bone with the Shred of Flesh, and brought the Lips of the Wound so exactly together, by Compresses, Bandages, &c. that the eleventh Day the Re-union of the Wound was made, and altho' the *Callus* was not begun, the Patient set out for the Army, whence he wrote me Word a little after, that he had left off a great deal of the *Regimen* I had enjoined him, and that he found himself very well after it.

C H A P. IV.

Of the Fracture of the Ribs.

IN this Chapter I shall consider what is capable of breaking the Ribs, and the different Ways they may be fractured, that I may deduce thence the various Means of reducing them.

Fracture
of the
Ribs with
a Wound.

The Causes capable of breaking the Ribs, are all bruising, but some are more so than others. Those which are extremely violent, as a Musquet Ball, or a Shiver of a Bomb, Grenado, &c. may easily break the Ribs, all-ways, and all-Manners; but, because these Sorts of Fractures are then look'd upon as Wounds in the Breast; I won't speak of them here, that I may keep wholly to the Examination of those which being without Wound, ought to be deemed only Diseases of the Bones.

Kinds.

The Ribs may be fractured two Ways; they may break so as that the fractured Ends may bend towards the *Pleura*, which I call an inward Fracture; or else the broken Ends may lean towards the external Muscles, which I term an outward Fracture.

Internal.

That which I stile an internal Fracture, is caused by a violent external Blow, which thrusts the broken Ends, and forces them towards the *Pleura*.

External
Fracture.

That which happens externally, proceeds on the contrary from the anterior and posterior End of the Rib's being compress'd one against the other by Powers diametrically opposite, so that the broken Ends turn outwards. Thus one may break a Bow by bending it.

Cases
wherein
this Fra-
cture
happens.
First
Case.

This Fracture happens in two different Cases.

The first is, when of two Bodies that press upon the two Ends of the Rib, one only is in Motion, whilst the other is at Rest; as when a Man lying receives a violent Stroke upon the foremost End of the Rib, or when a Wheel runs over the Fore-part of a Man's Breast, whilst his Back is against the Ground; or in fine, when any one is pressed against the Wall by

by the Pole of a Coach, or any other such like Thing.

The second Case, where the Ribs may be broken outwards, is, when the Powers that press the two Ends of the Ribs are both in Motion, as when a Man is squeez'd between the Wheels of two Coaches that are driving two different Ways; that is to say, when one is going upwards, and the other downwards.

'Twill be easily conceived by what I have just said, that whether the two Bodies that compress are in Motion, or only one of them, if the Compression is made on the Line which passes from the End of the Ribs to the *Vertebra*, the Ribs will approach each other, the Ends will bend; and if they break, the Fracture will be so that the middle of their Arch will become more acute, and will throw it self outwards.

All these Ways the Ribs must be fractured outwards.

The displacing of the broken Pieces is not of the considerable, because the Fore-part is kept close to the *Sternum*, and the Hind-Part to the *Vertebra* of the Back. There can be neither any considerable displacing internally nor externally, and yet less upwards or downwards, because the *Inter-Costal Muscles*, which wou'd be capable of causing the Displacings, draw each of them equally on their own Sides.

Sometimes there is but one Rib broken, at other Time, two, three, or four, and even more.

The Signs of these Fractures are diagnostick, and Prognostick; the diagnostick Signs are Unevenness, Crepitation, Difficulty of Breathing, and Pain.

As to these two last Symptoms, they are less in the external, because the Ends of the Bones don't

don't prick the *Pleura*. Besides a lesser Effort will break a Rib outwards than what will fracture it inwards, because the Blow that strikes externally, falls upon a spherical Body, which resists so much the more in that the *Fulcrum* of the *Sternum*, and the *Vertebra* takes off Part of its Force.

Of the
crepitation,
a
deceitful
noise.

The Unevenness is never great, because, as we have said, the displacing of the broken Pieces is but small. As for the Crepitation, one must not confound it with a fallacious Noise that accompanies almost all Contusions of the Ribs that are attended with an *Emphysema*; and 'tis known that in this Distemper there always is a hollow Noise proceeding from the Collision of the Air, that may be perceived by the Touch, but which is very different from that caused by the rubbing of two hard Bodies, as are the two Extremities of a broken Rib. I have already said several Times in this Treatise, that the Crepitation and *Cliquetis* might be discover'd by the Touch, which perhaps seems absurd, because the Ear is the Organ destined for the Perception of Sounds. However it be, if I hold two Nuts in my Hand clench'd, I shall be sensible of a Crepitation or Rubbing, which will not be perceptible to any one near me, and which I shou'd not observe my self if these two Nuts were rubb'd in the Hand of any other. This is not a Place to give a physical Reason for it.

Prognostick
Signs.

The prognostick Signs are derived from the various Kinds of Fractures, and Accidents.

As for the Fracture, that which is internal is more troublesome than that which is external; those which cause great Pains, with a Difficulty of Breathing, those which prick the intercostal Nerves, or those which open the
Blood

Blood Vessels belonging to them, are the most dangerous.

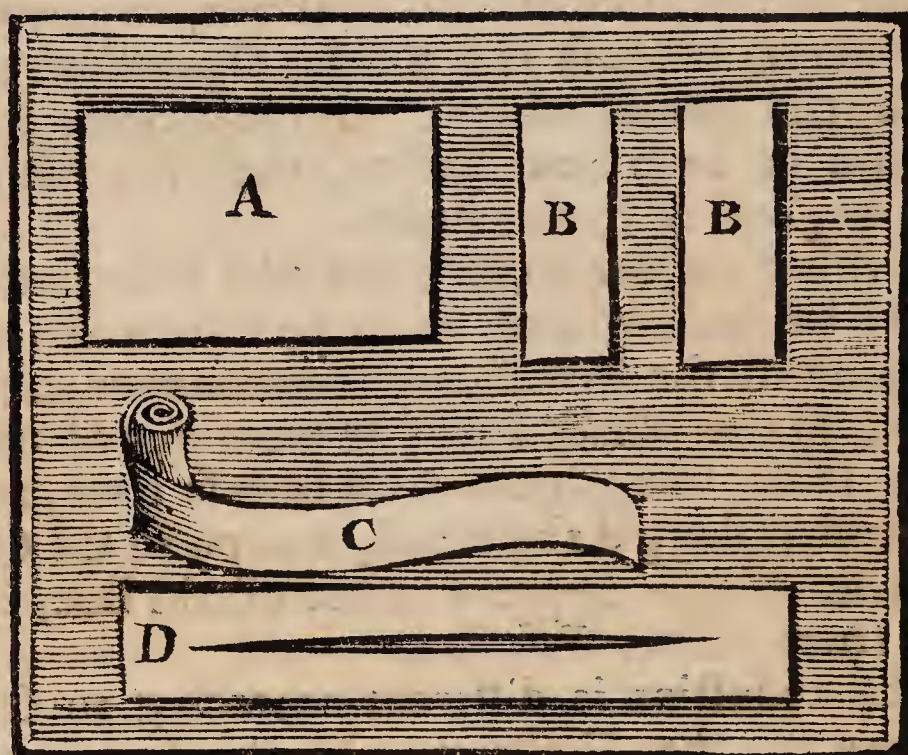
If the *Pleura* be torn, and one of the inter-^{Pleura} costal Arteries be prick'd by some Splinters, ^{open'd.} and the Blood spreads it self over the Breast; the Operation of the *Empyema* must be made; but if the *Hæmorrhage* be considerable, one ^{Hæmor-} need not trouble ones self about this Operati-^{rhage.} on, for perhaps the Patient will die before the *Hæmorrhage* be perceived, or before it be determined what Way to stop it. However one ought not to be in Suspence about making an Incision at the Place of the Fracture, to get at the Vessels, and use the proper Operations to staunch the Blood, whether by Stypticks, Ligatures, or even Compression, tho' this last is hard to practice in this Place.

If this Fracture were at the false Ribs, there ^{If it is at} would be nothing else to do but to make an ^{the false} Opening in the Breast, considerable enough to ^{Ribs.} discharge the Blood, but if it were one of the upper Ribs, the Wound must be left close, after having stopp'd the Blood, and make the Operation of the *Empyema* at the usual Place, in Case there be any Effusion.

The Reduction is different according to the ^{Reducti-} Nature of the Fracture. If the Ends are ^{on of the} turned inwards, one must do the contrary to ^{Fracture.} the Cause that fractured them: Therefore for this Reason one must press with both Hands the Fore-Part against the Hind-part, to bring the broken Ends outwards, and set them even with the other Ribs. If the Ends are turn'd outwards, which is uncommon, they must be thrust inwards, till they are on a Level with the other Ribs. One must not bear upon the Fracture it self, but on both Sides, least the sharp

sharp Ends of the Bones should prick the Flesh; which would occasion considerable Pains.

Dressings. As for the Application of the Compresses and Bandages, whatever the Fracture be, one must lay upon it the Compress (A) half a Foot square, steeped in Aromatick Brandy; the Compress (B) must be an Inch thick, three broad, and eight long; and they must be laid near the broken Ends, in the external Fracture, that they may thrust them, and oblige them to re-enter into their Places. On the



contrary, when the Fracture happens so that the Ends are turned inwards, the Compresses must be laid upon the Ends of the Ribs, *viz.* near the *Sternum*, and near the Spine, that the broken Parts may be thrust outwards; and, to retain these Compresses in this Situation, one must fasten them on with Circumvolutions made with the Roller (C) four Fingers broad, and four or five Ells long, which must be sustained by the Scapulary (D) fasten'd with strong Pins, or with basting. I don't know whether the

Pre-

Precaution used by certain Bone-Setters in sewing their Bandages every where and very exactly, would not be proper to be taken, not for the keeping on the Dressings, that is needless, but to prolong the Time of taking it off. I remember that I had laid a Dressing upon a Contusion in the Breast, and had fastened it on with Pins: A Bone-Setter was sent for, they came to give me Notice of it, I was not at home, but at my Return I went to the Patient. The Bone-Setter had taken off my Dressing, and clapp'd on another, affirming that there were two Ribs broken, and one depressed; I was looked upon as an ignorant Fellow. I had my Revenge; I persuaded the Patient, but with Difficulty (so great is the Prepossession of People, and so hard to conquer) that the Bone-Setter imposed upon him: A Consultation was granted; I was justified, and the Patient again put his Confidence in me, to which the Bone-Setter's not coming tho' sent for, contributed not a little. The Patient was cured of his Contusion in a little Time, and was convinced of the Bone-Setter's Knavery, who had not seduced him, if I had sew'd my Bandage, instead of fastening it with Pins; the Time it would have taken in undoing it, would have given me the Opportunity of getting soon enough to the Patient's to have met the Bone-Setter, who doubtless had not been eloquent enough to persuade had I been present. I have told this short Story, to shew that the Dressings may be fastened with Pins, and that sewing is only proper when one has to do with Children who may undo their Dressings, or when one is apprehensive of the Knavery, Unpoliteness, and Greediness of Bone-Setters.

A Story.

For whom the Story is designed.

Sinc.

Of the
Crack or
Cleft.

Since we are upon this Topick, it will not be improper to speak of the cleaving of the Ribs, 'tis a Term they use to express an incomplete Fracture: I believe that in this Fracture, Cleaving or Cracking may happen, the Possibility of it is demonstrable: But how impudent must he be who dares to averr it? Can he shew any Signs of it? By what Sense can he discover it? Is it by the Sight, the Touch, or the Hearing? The Rib is covered; there is no Unevenness; by what Signs then shall he have Knowledge of it? On this Occasion an honest Man is very much perplexed if he happens to be with a Bone-Setter who maintains that the Rib is crack'd, because if there are no Signs whereby to know that the Rib is cleft, there are none to discover that it is not.

Of the
Depression.

The Depression of the Ribs is another Disease with which the Bone-Setters delude the weak Multitude. I don't deny but that the Ribs may be depress'd by a Blow, a Fall, or some other like Cause; but I deny that there is any Operation to be performed for the raising them: They remain no longer so than during the Blow or the Fall; their Elasticity with that of the Cartilage and the Muscles raise them immediately, and one ought to treat this Distemper only as a Contusion. I shall speak hereafter of the Depression, I only mention it here *en passant*.

The Patient must be bled several Times after the Reduction of the Fracture of the Ribs, especially if the Pain be great; and he finds a Difficulty in breathing, one must prescribe an exact Diet, give Clysters, Anodyne Potions, and even Narcoticks; in a Word, one must make Use of every Thing that is capable of diminishing the Quantity, and abating the Motion

Motion of the Blood. All this being founded upon one sole Principle, which is that the Breast is the Work-House or Manufacture of the Blood, 'tis there, that it is attenuated and subtiliz'd by the Respiration; therefore the less Blood there is, the less Force is necessary, and the less frequent is the Respiration, for which Reason the Blood must be diminished by Bleeding and Diet. The more its Motion is quieted, the more easy and soft will be the Breathing; the Muscles of the Breast will be the less in Action, and the broken Ribs will be the more in that State of Tranquillity that is proper for their Re-union. Clysters are useful, both because they evacuate the *Abdomen*, and free it from the tainted Matter that might get into the Blood, and because the *Diaphragm* can more easily lie even towards the *Abdomen*, when it is empty, which renders the Breathing freer and less constrain'd. The Patient must be placed half upright in his Bed, that he may breathe the easier, and he must not speak, nor do any thing that is capable of increasing the Respiration. The Bandage must not be taken off till it becomes too loose, or incommodes the Patient.

Remedies.

Position.

When the Dressing is to be taken off.

General Events.

The most grievous Accidents in this Disease generally end in 12 or 15 Days, and at the Expiration of 30 the *Callus* is form'd entirely.

CHAP.

C H A P. V.

Of the Depressions of the Ribs.

Whether
the Ribs
sink.

What the
Depressi-
on is.

Bone Set-
ters.

What
guides
them in
their
Prognos-
ticks.

TIS not to be doubted that the Ribs are depress'd; I have already said it, but one must be either very ignorant or knavish to affirm that they will keep so without being fractur'd: The Ribs are depress'd (that is to say) that one or two Ribs may be thrust inwards, and in that Sense not be upon the Level with the Ribs next to them. When this happens by some Blow or Fall, they recover of themselves, and resume their Level, as soon as the Bodies that strike, or whereon they fall, no longer act upon the Place that is depressed; therefore 'tis either out of Ignorance, or to impose upon the Publick, that these Gentlemen abuse the Credulity of the People, by making them believe that they have raised the Ribs of Persons who at most had but Contusions; they even make no Scruple of pretending there are Fractures where there are not, calling, as a Witnesses to confirm it, the fallacious Noise that accompanies the *Emphysema*.

They hardly ever foretell the Danger of a Disease from the greatness of the Distemper; the mean and simple Aspect of the Patient directs them more frequently; every Stroke, every Fall supplies them with a Subject for a Miracle, which they render to their own Advantage more or less Great according to the Simplicity of the Patient: One shall have his Bones ground to Powder, or broken into a Thousand Pieces, who if he were of another Physiognomy would have but a simple Fracture,

ture, or a Depreffion, a Man of Senfe, or who is thought a Judge, fhall come off for a ftriking of the News. The following Story will confirm it.

A Bone-Setter was fent for 12 or 15 Years Obfervation ago to look after a Perfon who had fall'n from a Horfe, and faid he had broken his Ribs, the Bone-Setter coming found it no hard matter to make it believ'd that the Ribs were broken, tho' they were all whole, becaufe the Cries of the Patient, and the Pain he faid he felt, had already eftablifh'd it as a Truth in the Minds of all the Affiftants, who judged of the greatnefs of his Hurt, by his Cries.

He drefs'd the Patient as for a Fracture and Depreffion, but the Pains neither ceas'd nor abated, a Fever feiz'd upon him, attended with reachings to vomit, and the Jaundice with all its Symptoms; and the Patient being reduced to the laft extremity, lofing the implicit Confidence he had repos'd in the Bone-Setter, had recourfe even to thofe whofe Counfel he had neglected taking.

Ill management of a Bone-Setter.

I found upon him a very great Difficulty of Breathing, a violent Cough, a fpitting of Blood, with his Urine of a brick Colour, and his Looks wild; it was the 17th Day of his Fall.

The Bone-Setter having left the Patient on my coming, I cou'd only know what had been done from the Affiftants, who told me almoft exactly what I have related, excepting that they were perfwaded that the Patient's Ribs were broken, and that all his illnefs proceeded from their not having been well Set: A fort of Juftice they did the Bone-Setter, and real Surgeons.

I took off the Bone-Setter's ufelefs dreflings, and examin'd the place affected attentively, I found

In what Condition and the Part.

and found an *Oedema*, but not the least sign of a Fracture, not even the first formation of a *Callus*, which made me look elsewhere for the Cause of the Symptoms wherewith the Patient was afflicted. He had fall'n upon the five false Ribs of the Right Side, the Skin was a little swell'd, accompany'd with a considerable Fever, Redness, Hardness, and such a sharp throbbing Pain, that I did not at all scruple to say, that a purulent Matter was forming, and that there already was some, but it lay too deep to be perceiv'd by the Touch, the rather because I suspected the Defluxions being under the Ribs, perhaps even in the Liver, or at least in that part of it that join'd to the Diaphragm.

Having told my Sentiments, two things were requir'd of me: First to give a Reason for the Symptoms of the Distemper, and secondly to prescribe what was necessary to cure it.

My Sentiments upon the Disease.

To comply with the first, I said, that the Ribs not being broken, the Disorder proceeded from a violent Contusion of the Liver, occasion'd by the fall upon the false Ribs, which Contusion had not been so great, had the Ribs been broken, nor had it been attended with such ill Consequences, but for the ill management of the Bone-Setter, which was faulty in three things.

Three Faults of the Bone-Setter.

First, in that he had clapt on a Sear-cloth, a Medicine that prevents Perspiration:

Secondly, this Sear-cloth was kept on by Bandages that were too tight, which oppressing the Breast hinder'd the Breathing.

Thirdly, he had not blooded the Patient, as he ought to have done, not only to mitigate the Pain, but also to avoid the Defluxion, which I already believ'd at such a height, that
the

the letting blood then cou'd at most but abate the Obstruction of the neighbouring Parts, to prevent a Gangrene, which never fails attending the Suppuration of this sort of Defluxions, a Gangrene so fatal and so swift, that it carries off the Patient before the Maturity of the Impostume.

The second Thing that was desired, was the most requisite, 'twas to propose means to heal this fatal Disease, wherein the Gangrene was yet more to be feared than the Impostume, because it gave no Time to deliberate. My advice was to bleed the Patient, and repeat the same as often as his strength would permit; to apply all over the Hurt a Cataplasm made with the Pulp of Emollient Herbs, and Anodynes, observing a proper Drink, Diet, Method of Cure.

Paris, the Day following I found the Patient much better, I bled him again, and order'd it to be repeated at Night, and that the Cataplasm should be continued, which had softened the Part already so much that I cou'd feel the Interval between the Ribs; I found them at a greater distance than in their natural Condition, and carrying my Fingers under the Cartilaginous side of the Ribs from the Cartilage *Xiphoides* to the End of the last Rib, I felt a considerable hardness, and the Patient felt very sharp Pains. The next Day I found all the outside much easier; and perceiving that there was a hollow Fluctuation near the last of the false Ribs, I propos'd opening the Abscess: 'Twas oppos'd, the Danger seem'd to lessen, and the Confidence of the Patient diminish'd also, whereas in Persons of good Sense it ought to have produced a contrary Effect. I went then no more to see

The Operation proposed.

him, and I was inform'd that a Mountebank, a great purifier of the Blood, had worm'd himself into his good Opinion, by promising to make him void the Imposthume by Urine. Having made use of these Remedies for Fifteen Days without any Relief, He had again recourse to me. I cou'd not refuse visiting nor taking Care of him, and I found such long and violent suffocations upon him, that I was afraid of seeing him expire in my presence; I touch'd the Part affected, which I found much alter'd, the Tumour that lay hid under the false Ribs was turn'd external, and the Fluctuation was as manifest as in the Dropsie *Ascites*. There was also a Pulsation like that of an *Aneurism*, which did not prevent my proposing to open it, because I had already open'd Tumours of this Nature, which had taught me that whoever in a like Case are apprehensive of opening an *Aneurism*, their Fear is ill grounded.

The O-
peration
made.

Having first made a Prognostick to the Parents, wherein I shew'd them the little Hope there was of a Cure, and that the only means to save the Patient was to open the Abscess, I lanc'd it, and the first Day I drew out two Pints of Pus, the next Day there came out a Pint, the subsequent Days to the number of Seven, the Matter diminish'd continually, and some of the Symptoms, but the Vomiting and Looseness, Fever, stoppage of Urine, Tumours, and Dropsy, carry'd off the Patient the 27th Day after the Operation.

The Pa-
tient dies.

The
Corpse o-
pen'd.

I open'd the Corpse, and observ'd that the Abscess was between the Liver and the *Diaphragm*, from its nervous Center to the Place where this Muscle is fasten'd to the last of the false Ribs; the Suspensory Ligament was destroy'd, the Superficies of the Liver ulcerated.

ated almost the whole extent of the Abscess, the *Diaphragm* stuck to the Ribs, and to the inferiour Lobe of the Right Lungs; there was a Pint of purulent Water diffused over the Breast, and all the Ribs were entire, without any appearance of a Fracture, or *Callus*.

It may be remark'd, in this Observation, that there being no Fracture in the Ribs, the Contusion of the Liver was the essential Part of this Disease, and that it only became mortal thro' the Ignorance of the Bone-Setter, who neglected bleeding, and clogg'd the breathing by Bandages which had been too tight, even if the Ribs had been fractured; thus by this ill management the Imposthume was caused.

Nevertheless the Patient might have been cured in spite of all these mistakes, if, instead of giving Credit to the second Mountebank, they had let me lance it when I first proposed it; 'twas the time that the *Pus* began to discover it self, it had not as yet caused all the Disorder, and one might with some probability have hoped for a Cure.

This is not the only Observation I cou'd relate, but 'tis one of those that proves beyond Question, the Danger of hearkening to these vain, presumptuous Persons, who cloak their Ignorance under a talkativeness, or else under an artful silence, which is always attended with the vain and seducing promise of Curing.

Reflection.

C H A P. VI.

Of the Fracture of the Sternum.

TH E *Sternum* may be forced in and broken by some violent Blow ; it is liable to Accidents almost like those of the Ribs ; 'tis even seen sometimes that an inward *Hæmorrhage* happens by Reason of the Arteries, and Veins of the Breasts that lye under it, but this is only in great Fractures, where the Bones, being considerably thrust inwards, tear or cut the Vessels.

Diagnostick and Prognostick.

The Fracture of the *Sternum* is sometimes hard to be known ; because in a little Time there comes such a swelling as disguises the Disease, and prevents its being discover'd by the Touch ; however it is dangerous not to find it out at first, for 'tis often in vain to wait for the end of the Tumour, and other Accidents ; they are sometimes so fatal, that the Patient expires before they disappear, in spite of all the Assistance that can be given him. I once open'd the Body of a Man that dy'd of this Distemper, who had a Gangrenous Swelling that took up the whole external part of the Breast and Neck up to his Chin ; I found that the second Bone of the *Sternum* was thrust in, and compress'd the Heart, that there was abundance of bloody Water in the *Pericardium* and the sides of the Breast.

I have observ'd that a Man is subject to a Observa-
dry Cough, with a Palpitation of the Heart, tions.
and difficulty of Breathing, after having the
lower part of the first, and upper part of the
second Bone of the *Sternum* forced inwards;
because the Depressions not having been raised,
cause an internal swelling and clog the Respi-
ration.

Spitting of Blood, violent and frequent Symp-
Coughing, Suffocations, and a Fever are Symp- toms.
toms almost inseparable from the Fracture of
the *Sternum*.

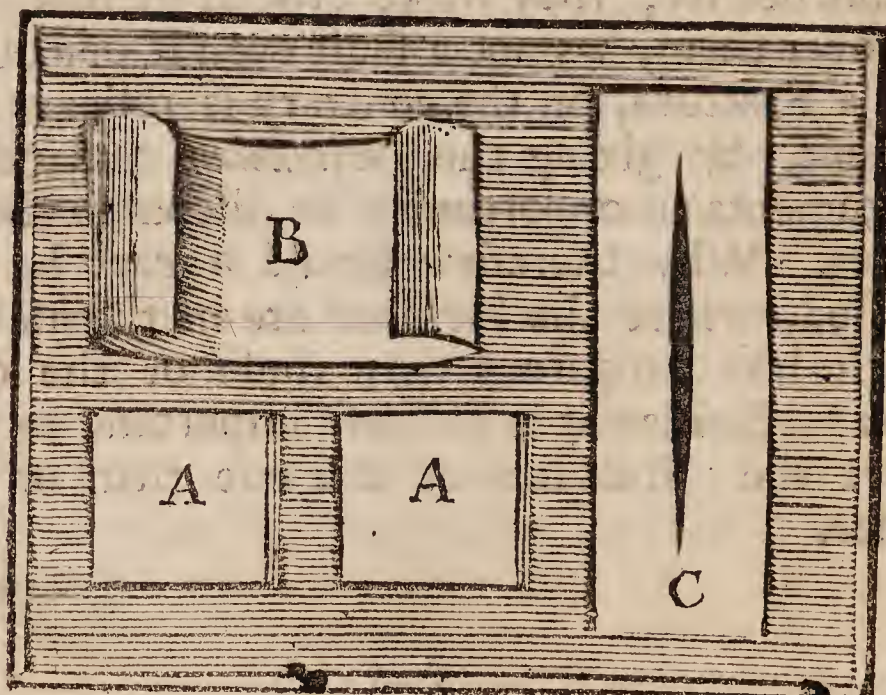
Where the Pain and other Symptoms con- Error in
tinue after the Reduction of the Bones, an Practise.
Abscess will be form'd under the *Sternum*, the
Persons spit purulent Matter, and have all
the Signs of the *Peripneumonia*. It is therefore
of great importance to discover and reduce
this Fracture, and if 'tis impossible to succeed Remark-
with the Hands, one must not hesitate at able O-
making an Incision upon the Place affected to peration.
find out the Fracture and raise the Bones
with the *Elevator*, *Trepan*, or other Instru-
ments.

The Example of Fractures in the *Cranium* Parallel
authorises us; they make crucial Incisions to of the
discover them, 'tis not a fault even if one don't Fractures
find a Fracture, on the contrary it relieves the of the
Patient, by giving the *Pericranium* and other Cranium.
Teguments an opportunity to discharge them-
selves. Why therefore should a Part be re-
spected, where the Incisions are in themselves
much less dangerous than those of the *Cra-
nium*? Besides it is not less important to dis-
cover the Fractures of the one than of the
other.

The Cure.

Operation To raise the *Sternum*, the Breast must be press'd from Right to Left, and from Left to Right, which obliges the Ribs to advance forwards, and raise the *Sternum* by thrusting out their Cartilages: If this way is insufficient, and the Accidents are fatal, there is no danger in making an Incision, and raising the pieces of Bone, as has been said; and even if an Abscess were form'd under the *Sternum*, for want of remedying it at the Beginning, the Trepan may be apply'd; as is done to the *Cranium*, to discharge the *Pus*, or even the Blood, and raise the pieces of Bone that are forced in.

Dressing. The Dressing is very plain; for the simple Fracture there is only need of two Compresses (AA) steep'd in Aromatick Brandy, and a Body-bandage (B) supported by a Scapulous (C.) And if one has made an Incision or Trepan, the Wound must be dress'd, as it should be otherwise, always using Compresses, a Body-bandage, and the Scapulary.



C H A P. VII.

Of the Fracture of the *Ossa Ili* and *Pubis*.

THE *Ossa Ili*, and *Os Pubis* seldom break ;
 I have often seen both the one and the other happen to Soldiers, who, being blown up by Mines, fall down again upon the Guns, or other hard Bodies : The most part of these Fractures were without Wounds. Those with Wounds are very common in the Army, by Fire-Musket-shot and other Fire-Arms, we shan't mention them in this Treatise.

The *Ossa Ili* may be fractured different ways ; if they are broken Cross-ways, the Crest of the *Ossa Ili* is removed from the rest of the Bone, because the *Gluteus Major* and *Medius*, which are stronger than the *Iliack* Muscle, carry the broken part on their side, and the oblique Muscles of the *Abdomen* have not force enough entirely to oppose it.

The Fracture is hard to discover when there is a swelling, and 'tis seldom that there is not one, because a Blow that will break such a Bone, must make terrible Contusions on the Muscles, Membranes, and *Aponeuroses* of those Parts.

When there is no Tumour, the Fracture is easily found out by the Touch, and the Cre-pitation, which one must not confound with the noise of the *Emphysema*.

The Accidents that attend this Fracture are Pains, at the Part affected, occasion'd by the Contusion, and by the tearing, the Prickings and

and other Divulsions that are made by the Inequalities of the broken Bones.

The Belly becomes stretch'd, inflam'd, hard, and bound, and the Gripes, the Hickup, Vomiting, Stoppage of Urine are generally the Consequences.

Prognostick.

'Tis more difficult to retain the Bone, than to reduce it; the Danger is great when the Accidents above mention'd meet, especially if the Patient's Pulse be low, and his extremities cold.

Observation.

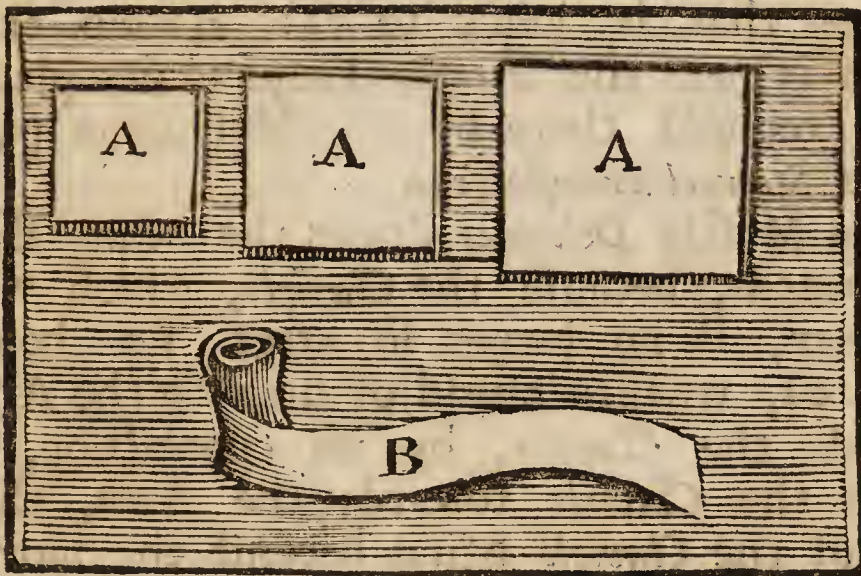
Death is unavoidable if in his Vomitings he brings up a Matter like Chocolate: This Matter, which is nothing but the Blood congeal'd by the *Menstrum* of the Stomach, shews that some Vessels are broken in that Intestine: I have never known any recover that had this Symptom; and it mostly comes after a stroke upon the Region of the Stomach, the Reason is easily conceiv'd.

Of the Cure.

Operation.

To make the Reduction, the Patient must be plac'd on the Bed-side, lying on the side opposite to the Fracture, having two Pillows, upon one of which the upper Part of the Body must rest, and upon the other his Thigh, Leg and Foot, so that the Part opposite to the Fracture is not supported by any Thing, and the fractur'd side is bent, that the Muscles of the *Abdomen* and the *Glutæi* are sufficiently relax'd, and the Reduction of the fractured Piece may be made with the Hands. After the Reduction, the broken

broken Bone must be fix'd with two or three Strong Compresses (AAA) dip'd in Aromatick Brandy; they must rest upon the displaced Bone to retain it in its right position, and must extend along the Belly and the Thigh. They must be kept on by the Band (B) four or five Ells long, and four Fingers broad.



If general Remedies, and especially bleeding are necessary in any Distemper, 'tis in this. One must make use of every thing to prevent the Inflammation of the *Abdomen*, which is a terrible Accident.

C H A P. VIII.

Of the Fracture of the Clavicle.

THERE is no Fracture more subject to Remark. displacing than that of the *Clavicle*, because it cannot be broken but by an external Blow, which thrusts and forces the Pieces towards the Breast, and that moreover the weight

weight of the Arm carries one of the Pieces downwards, whilst the other is rais'd upwards by the Muscles.

It is displaced length-ways and breadth-ways; the Causes of its being displaced breadth-ways are strokes, and the weight of the Arm which draws the Shoulder downwards, and consequently that part of the *Clavicle* that is join'd to it: Herein that which is next the *Sternum* keeps in its place, being retain'd there by the Musculous part of the *Sternoclinomastoideus*.

Displa-
cing.

The Muscle *Deltoides* draws the other End downwards, because the *Clavicle*, which was the Stay, is no longer so after its being fractured, whence instead of drawing the Arm towards the *Clavicle*, by its contraction, it draws the *Clavicle* towards the Arm, that part of the *Clavicle* being become the moveable point, and the Arm the fix'd one.

Displa-
cing.

It is displaced length ways, because the Arm, being no longer supported by the *Clavicle*, falls upon the Breast: 'Tis known that in its natural state the *Clavicle* serves as a Stay, and keeps the Arm at a distance from the Breast, that it may move with Ease; therefore when 'tis fractur'd it can no longer serve for this purpose, and the Arm being no more kept outwards must fall upon the Breast, the rather by reason that the *Omo-plata* and the Arm are drawn on this side, the one by the little, and the other by the great *Pectoral*, which drags the End of the *Clavicle* that is join'd to the *Acromium*, and makes it pass under the End that is join'd to the *Sternum*.

Signs.

The Signs whereby to know this Fracture, are the same with those we have given in general

general for all; but there is one more certain, that is, the fall of the Arm upon the Breast.

The Causes are Strokes, Falls, and violent Causes. Motions.

The Prognostick is the same as is drawn from other Fractures in general: One may say moreover that the *Clavicle* is more easily broken than the other Bones, both because external Blows have more Power, (as it is situated parallel with the Horizon, and most part of the Strokes which one receives fall perpendicularly upon it) and because it is neither cover'd with Muscles nor Flesh that can deaden the Blows. A solid Body cou'd hardly be better placed than the *Clavicle* to be broken; Remark. it resting only upon its two Ends, whilst the remainder of it has no support at all.

The Fracture of the *Clavicle* is easy to be Remark-reduced, because the Extensions are not hard to be made, and because it being less cover'd with Muscles, is less difficult to touch and grasp with the Fingers, especially in such as are lean.

It is harder to keep in its place than other Bones, for three Reasons.

First, Because it is small, and the Ends that are reduced touch but by a very little Surface.

Secondly, The Bandage can't surround the Bone, as in the Arm, or Leg, and it is difficult to place Compresses; and even they, if one is not very careful, thrust in the Pieces of the Bone, and produce an Effect almost like that which caus'd the Fracture.

Thirdly, The Arm and the Muscles seem continually to draw the *Clavicle* towards the *Sternum*, unless one takes the Precautions which we shall lay down in the Cure hereafter.

To

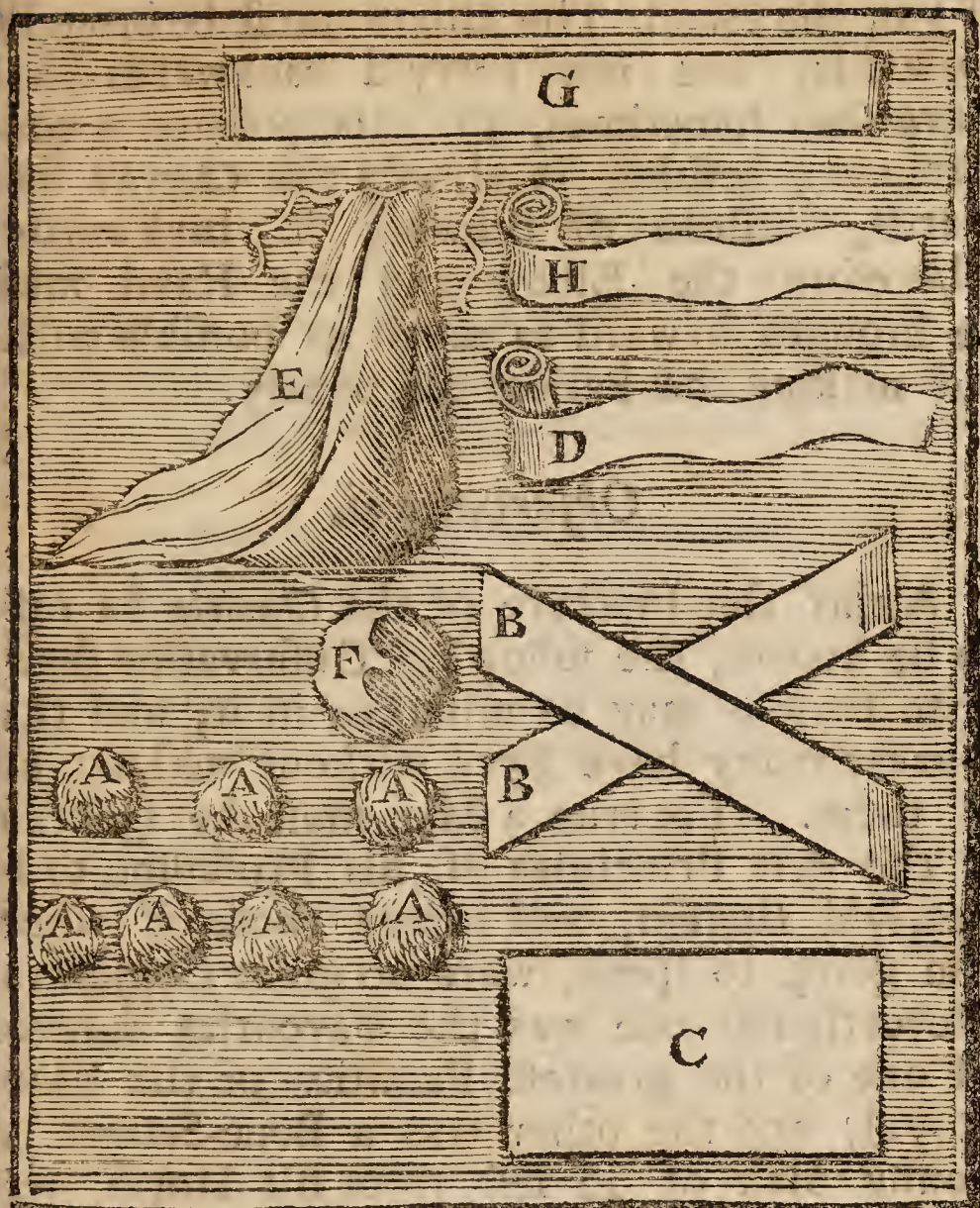
The Cure To reduce the *Clavicle* when broken, the Patient must be seated on a low Chair.

A Servant must set his Knee upon the Spine, between the *Omoplate*, and take the two Shoulders, that is to say, the Ends of the *Omoplate*, and the Arms with both Hands, and, having placed himself conveniently at a proper height, he must draw the Shoulders equally backwards, whilst he thrusts the whole Body forwards with his Knee, which makes the Extension and Counter-Extension.

The Surgeon ought to stand before the Patient, and when he perceives that the Servant has made the Extension and Counter-Extension, he brings near and adapts the Ends of the *Clavicle* with his Fingers; and in putting on the Dressings, he appoints a second Servant to keep the Bones thus join'd together, whilst he performs the rest of the Operation.

But when the Bones have no Stay, and can't be kept right, I lay on a longitudinal Bolster (G) two thirds of an Ell long, and two Fingers broad; then over it I make a Figure of 8 with the Band (H) 3 Ells long, and two Fingers broad. The Crossing of the Figure of 8 must be between the Shoulders, and the two Circles must turn round the Ends of the *Acromion* on each side, so that this Bandage keeps the Shoulders backwards, and does the same thing as is before mention'd in making the Extensions.

After the Application of this Roller, the Stopples (AAA) must be clap'd on to fill the Hollows, wherefore one must prepare several (AAA) being made of Lint or Tow dip'd in the White of an Egg: Over these I lay the



the Crucial (BB) cover'd with the Compress (C) and the whole must be kept on by the descending Bandage *Spica*, made with the Roller (D) 5 Ells long and 4 Fingers broad. After this the two Ends of the longitudinal Bolster (G) must be turn'd back over the Breast; the one from the Right side to the Left, and the other from the Left to the Right, contrary-ways to each other, and one must fasten them with strong Pins. These two Ends thus revers'd contrary-ways hinder the Figure of 8 from slipping backwards, and secure the whole Bandage. Then the Arm must be placed in a Scarf (E) and the Pellet (F) in

(F) in the Hand. The Elbow must be brought forwards, and not carry'd backwards as I have seen sometimes, for this posture is constrained; besides, it thrusts the *Clavicle* forwards, instead of drawing it backwards: Therefore the Elbow and the Hand must be brought forward as much as possible without making the Patient too uneasy.

Observations.

Altho' the Fracture of the *Clavicle* be easy to be known, the following Observation shews that Persons may be mistaken in it, and that a great many have Eyes without making use of them. 'Tis true a Man must be ignorant of the first Principles of his Profession to be deceiv'd therein, and indeed those of whom I'm going to speak, were no great Conjurers: Nevertheless one was the Favourite Surgeon of one of the greatest Families of the Blood Royal, and the other was a Bone-Setter. A young Man of 22 fell from his Horse, and bruise'd the End of the *Acromion* which produced an *Ecchymosis*; he was blooded several Times, and had Compresses steep'd in Brandy laid upon the Part, which Cured him.

A little after he discover'd a swelling on the middle of the *Clavicle* on the same side, which pain'd him very considerably; one of my Brethren, whom he consulted, found out his Distemper; but the Patient wou'd not give credit to him; he went to the Surgeon that had been recommended, who was of Opinion that he had broken his *Clavicle* in his fall, and that, his Surgeon not having discover'd it, it had clos'd again of it self, which had occasion'd a Deformity in the *Callus*. After this
the

the Young Man had recourse to a Bone-Setter, who told him that his *Clavicle* must be broken again to replace it better; he came thereupon to consult me, and I, having examin'd him, and ask'd him some Questions about Times past, found that this Tumour was a Venereal *Exostosis*, which I encountering with Mercurial Frictions, procured him a good condition'd Flux, and cured him perfectly.

There are two Things to be remark'd in the Error of these Gentlemen; the first is their having taken this Swelling for a deform'd *Callus*, and the second the advising the Patient to break this supposed *Callus*, to set the Bones again better.

As to the first, I say that this Disease cou'd not reasonably be taken for a Deformity of the *Callus*, because the *Clavicle* had not been broken, which is proved by three Reasons; first, because the Patient did not complain at the Time of his Fall, of Pains in his *Clavicle*, and 'tis known he would have felt very sharp ones if that Bone had been broken.

Secondly, altho' the *Callus* had been form'd, the Arm would have been found in an unnatural Position, as it always is when the *Clavicle* is broken; that is to say, it would have been unsteady, and without Force, resting upon the Fore-part of the Breast, because this Fracture never happens without the Bone's being displaced, as has been said.

The 3d Reason wherefore they were in the wrong to take this Tumour for a deform'd *Callus*, even if there had been a Fracture, is, that the Reduction not having been made, the *Callus*, instead of being found at the middle of the *Clavicle*, as was this Patient's Tumour,

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must

must have been near the *Acromion*, as I have since seen it in an Officer of her serene Highness the Dutcheſs of *Brunſwick*. This Officer had his *Clavicle* broken in *Provence*, and not having found any one there that could reduce it, the Pieces had re-united of themſelves one upon the other, ſo that the End that is joined to the *Sternum* went over the End that joins to the *Acromion*: And as, at that Time, the Arm, and conſequently the *Omoplata* draws always near the Breſt, the End of the *Clavicle* that is joined to the *Acromion* was come nigh the *Sternum*, and that which is joined to the *Sternum*, near the *Omoplata*; ſo that the nutritive Juice which had flow'd from the latter, had form'd a *Callus* an Inch from the *Acromion*, a Place where the *Callus* had not been form'd if the *Clavicle* had been reduced.

How then can any one adviſe the breaking the *Clavicle* again when there is a Deformity in the *Callus*, ſince the *Callus* of the *Clavicle* is generally deform'd, however well it may have been reduced? The Reaſon is becauſe the Dreſſing can't compreſs the nutritive Juice near enough; beſides, one may give this Advice, when the Deformity proceeds from the Bones being got one upon the other. This may be diſcovered by two Things; firſt, when the *Callus* is near the *Acromion*, as has been ſaid; and ſecondly, when by meaſuring the *Clavicles*, that which is hurt proves ſhorter than the ſound one; but when both are of the ſame length, one muſt be very ignorant to be deceived therein. I concluded that the Swelling of the Patient beforementioned was an *Exoſtoſis* from three indisputable Points; firſt, becauſe the Length of the *Clavicle* was the ſame as before. Secondly, it had not been reduced; and thirdly, he had
had

had venereal Distempers, whereof he had never been well cured.

CHAP. IX.

Of the Fracture of the Omoplata.

THE *Omoplata* may be broken either in its Body, or its Appendages: Its Body may be broken but in two Pieces at the most, its *Epiphyses*, as the *Apophyses Acromion*, the *Coracoides*, the *Spine*, and its Neck may be fractured also. I have never seen the *Apophysis Coracoides* broken, but by Gun-Shot.

The Body of the *Omoplata* may be broken *Kinds* long-ways cross-ways, or obliquely; when it is broken long-ways, the *Spiny Apophysis* is broken a-cross, and then there can hardly be any great displacing, because the Surface of the fractured *Spine* is considerable, which makes it difficult for the Bones to get one upon t'other: On the contrary, when it is broken across or obliquely, the fractured Pieces are so thin, and consequently the Surfaces whereby they are join'd, that the least Contraction of the Muscles force one Piece over the other, let the Blow have separated them never so little, or the Muscles of one Side have got the better of those on the other. For this Reason I have almost always seen the hind Part under the Fore-part, on Account of the *Serratus Major* and *Sub-Scapularis*, which being fixed to the *Basis* make it turn topsy-turvy; then the *Infra Spinatus*, *Rotundus Major* and *Minor* draw it under the Fore-Part, more or less.

The Signs, whereby this Fracture is known, are the same with those we have given of all Fractures in general, and besides there is generally an *Emphysema*.

I have already observed the *Emphysema* to be a Symptom that attends Fractures, and even great Contusions on the Region of the Breast. I have not explained it, which methinks I ought to have done: And there are a great many who perhaps will not be able to imagine how the *Emphysema*, which is a windy Distemper, can come where there is no Wound, thro' which the Air might get in: The *Emphysema* has been seen in Wounds in the Breast, and in those of the *Aspera Arteria*, and it has been easily comprehended that the Air that issues out, or enters in at these Openings, may lodge in the *Sacculi Adiposi* that are adjacent; but 'twill be asked whence comes the Air that forms the *Emphysema*, which, (as I have said) accompanies the Fractures and Contusions of the Ribs, and those I have observed in Fractures of the *Omoplata*, where there is no Wound: The subsequent Observations will answer this Question.

1st. Observation, the Wounds that penetrate the Breast, or that pierce the *Trachea*, are not the only ones that are attended with an *Emphysema*; this Symptom happens also in those that do not penetrate; we have seen severall of this Kind, and likewise many that did penetrate where there has been no *Emphysema*.

2d Observation, the *Emphysema* often accompanies Wounds in the *Abdomen*, whether they penetrate or not; I have often known it in Wounds in the Arm and Thighs, and they who have seen a great many Wounds by Gun-shot, know that there are few but what have
this

this Symptom, if they have been never so little exposed to the Air before their first Dressings are put on.

3d Observation, a Cobler returning from *Vauxgirard* to *Paris*, was so cudgell'd, that he was bruised to the very Bone in several Parts of his Body; all the Places that had been struck made a Noise, and almost his whole Body became one *Emphysema*: He died, I opened him and was very much surprized at finding Air every where, the Knife cut no one fat Part but it made a Noise; and what I remarked, which was very particular, was, that almost all the Muscles had lost their natural Consistence, and made no Manner of Resistance to any Thing, whether one drew them long-ways or a-cross, they were equally easy to be separated.

4th Observation; there are Imposthumes open'd every Day, out of which, jointly with the *Pus*, there issues Air that makes a Noise, as if it came from a Bladder blown up; one may even see Part of the *Pus* frothy or in a Foam.

5th Observation, are not Gangrenes, that come after *Erysipelatous* or *Phlegmonous* De-fluxions, attended with an *Emphysema*?

From all these Observations a Man may conclude, that there are two Sorts of *Emphysemas*; one whereof is caused by the external Air that issues out of the Wounds of the Lungs, Breast, or *Trachea*, which is that mentioned in the first Observation.

The other Sort must proceed from the Rarefaction of the Air that is found in the Juices and the Substance of the Parts, which is that of the three last Observations; and indeed, when there is no Wound, one can't believe

Conclu-
sion of the
Observa-
tion.

that the external Air has enter'd to form these *Emphysemas*; nor that the Air of the Breast and Lungs has got thither, at least not by sensible Openings, since there is no hurt in the Lungs nor Breast: It proceeds then from the Fermentation of the diffus'd Juices, which disuniting the essential Parts of the Liquids, breaks the Prisons of the Particles of Air, which, being no longer confined, dilate themselves, rarefy, and uniting together, form an *Emphysema*.

Prognostick.

If the Fracture of the *Omo-plata* is simple, and without any considerable Contusion, it is not fatal; on the contrary, if it is attended with a violent Contusion, a Tumour, *Emphysema*, Fever, Pain, and Difficulty of Breathing will follow, and there is great Danger, especially if the Patient be fat, *Cacochymick*, or *Plethorick*.

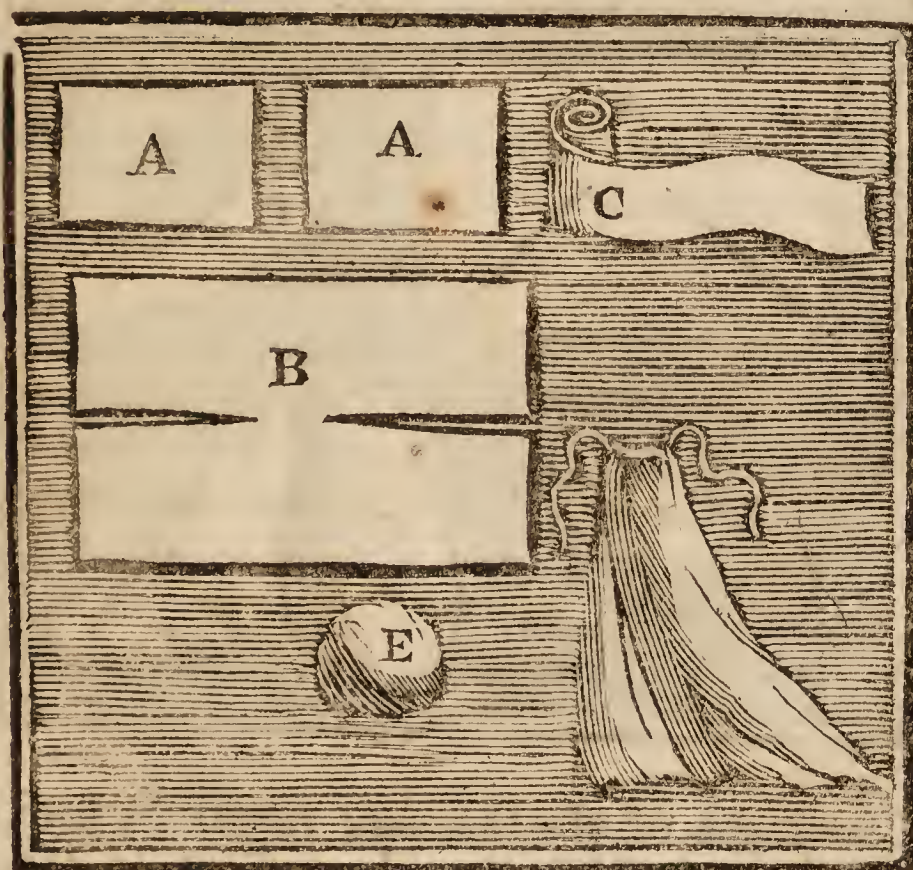
Cure.

Manual
Operati-
on.

The Reduction is pretty difficult to be made, when the Bones are displaced, and the Pieces are got one upon the other; becaule the *Omo-plata* is cover'd with strong Muscles, and one cannot get the better of them by the Extensions, for want of having Hold of the Pieces, that must be brought even with each other. However, 'tis for this End that they raise the Arm forwards, putting the Hand upon the Head, so that the Nose is over against the Angle of the bending of the Elbow. Whilst an Assistant keeps the Arm in this Position, the Surgeon does his utmost to replace the Bones with his Fingers, to the doing whereof the Muscle

Rhom-

Rhomboides contributes very much, because it retains the hinder Piece near the Spine, whilst the Surgeon brings the Bones together. When they are reduced, one must keep them right with both Hands, causing the Arm to be let down softly, and following the *Omo-plata* till it be above the hinder Part of the Ribs, which serve as a fastening to it on that Side. To fasten it on the outside, they fix the thick Compresses (AA) from the Spine of the *Omo-plata* to underneath the lower Angle, which must reach down towards the Back-Bone, and they cover them, and the whole Shoulder with the large Compress (B.) Then the Baudage *Quadrige* must be made with the Roller (C) four Fingers broad, and five or six Ells long, more or less, and the Arm must be placed in the Scarf (F) with the Pellet (E) in the Hand.



General
Remedies.

The Patient must bleed plentifully, his Regimen should be strict, and he must keep silent and quiet, as in the Fractures of the Ribs and Sternum.

First
Way to
raise the
Bone.

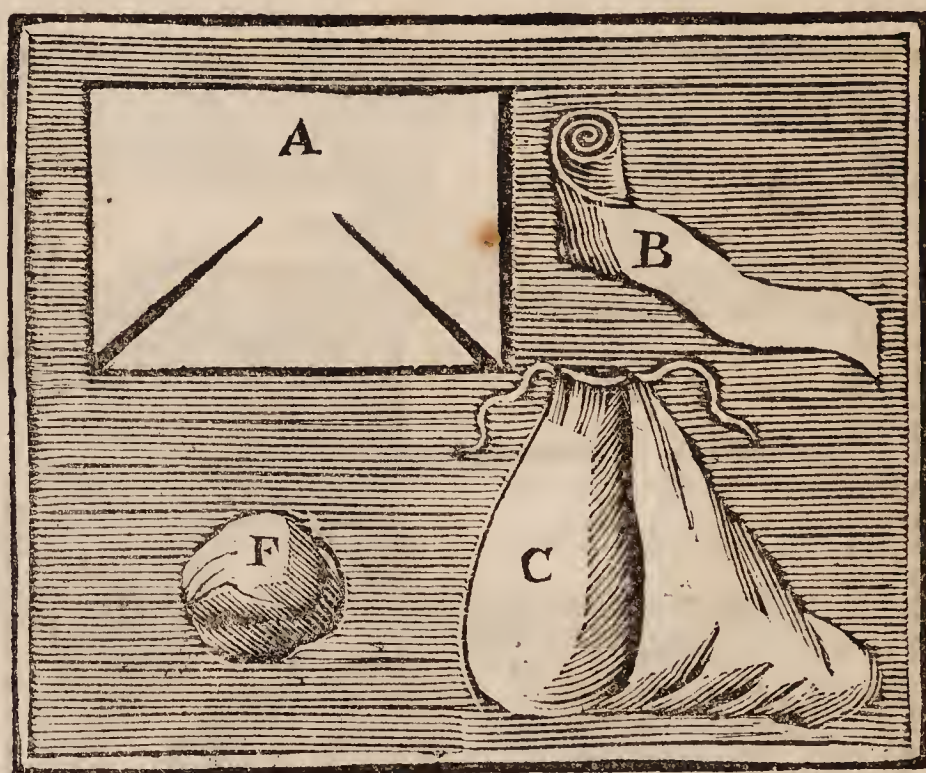
If the *Acromion* be fractur'd, they endeavour to raise it one of these two Ways. The first is by raising the Arm to relax the *Deltoides* and putting the Ends of the Fingers as far as one can under the *Acromion* and the *Clavicle*, to draw them upwards.

Second
Way.

The second Way is to take hold of the Elbow to thrust the *Humerus* upwards vertically, and to make Use of the Head of the Bone to thrust the *Acromion* upwards and raise it.

Dressing.

They put on the Compress (A) steeped, and make only a contentive Bandage with the Band (B) then they use the Scarf (C) with the Pellet (F.)



Observation.

The Neck of the *Omo-plata* cannot be broken but with great Difficulty, because it is defended by a great many Muscles, by the *Acromion*, the *Clavicle*, and the Head of the *Humerus*; never-

nevertheless I have seen it broken near the Edge of the Socket. It was easily reduced, but very hard to contain, and the Patient continued lame.

Observation.

I was one Day at a Consultation for a Lady who had fallen about six Weeks before, and a great many fruitless Attempts had been made to reduce her Arm, which we found dislocated. The Consultation was famous, all Sorts of Ministers of Health were there, and even the Bone-Setter who had the Patient under Cure, who affirmed that the Bone was well set, and that if she did not use her Arm, 'twas because the Socket of the *Omo-plata* had been broken, and that therefore there was both a Luxation and Fracture. Those who were experienced in the Art were not satisfied with these Words, they would have Proofs, and they desired no other of him but to tell the Signs whereby he had discover'd that there was a Fracture of the Neck of the *Omo-plata*: He could not give us any, which would have been very easy for him to do, since the Question was about a Thing of six Weeks standing, whereof he had been the only Witness. Upon this only, his having no Proofs, we might conclude that his Allegation was false; besides, he had said nothing in six Weeks, and 'tis known that those Gentlemen don't usually make Distempers less dangerous than they are. He thought to creep out at this Loop-Hole, but he did not know the Way; the Reduction was made in his Presence, and he said not a Word, which was wonder'd at.

'Twas

'Twas then demanded whether the Fracture of the *Humerus*, and the Fracture of the Sides of the Cavity of the *Omplata*, cou'd happen together. All the Persons of good Sense, and expert Practitioners agreed, that it was morally impossible for Reasons founded upon the Structure of the Parts, and the Laws of Motion.

The Structure of the Articulation shews that the Thing is impossible: First, because the Sides of the Cavity is much harder than the Head of the *Humerus*; and therefore in striking against each other, the latter would be broken sooner than the former.

Secondly, The Head has a great deal more Surface than the Cavity, therefore when a Body which has much Surface, strikes against a Body harder than it self, the hardest Body must resist, and the softest must be broken in Pieces. It may be objected to me, that a Candle being shot from a Gun will pierce a Deal Board, whose Body is much harder than it self: 'Tis true, but if this Candle did not come Endways, where it has least Surface, this would never happen, whatever Force were given it.

The 3d Reason why the Head of the *Humerus* cannot break the Side of the Cavity is, that it is not shot from a Distance like a Candle; on the contrary, it immediately touches the Cavity.

The 4th is, That the *Omplata* is a Bone whereupon the Head of the Bone does not bear in a Line of Gravity; and besides, it has no Bone that serves it as a Stay, to make it able to resist; on the contrary it gives Way, and all the Motion that the Head of the Bone imparts to it is deaden'd and lost in the Flesh,
and

and other soft Bodies wherewith it is incompassed.

5. Let us suppose that 30 Degrees of Motion are sufficient to luxate the Arm, what must happen when in a Fall these 30 Degrees are communicated to the Head of the *Humerus*? I answer that the Determination of the Motion must decide it; if the Head be determined by a Line that does not tend to the Cavity, it will be forced out, and the Remainder of its Motion will be imparted to the Parts adjacent; if it is thrust by a Line that falls upon an excentrick Point, the Head may be beaten back a little, and if its first Determination be not destroyed it may again dislocate; and if the Head moves upon a Line that terminates in the Center of the Cavity, it will not come out in that Case, and if the Motion be strong enough to cause a Fracture, it will be the Head, and not the Socket, which will be broken.

From this last Reason it may be concluded, that if the Bone luxates, neither the Head nor the Cavity are in Danger, and that if it does not luxate, the Head suffers all, and the Socket resists.

I have known this Case happen, a Man fell upon his Shoulder, having been just run three or four Times through with a Sword; I was call'd, he complain'd more of his left Shoulder whereon he fell, than of his other Wounds, whereof he died 24 Hours after. I opened him, to give an Account of it; I examined the Articulation of the Shoulder, wherein I found that the Head of the *Humerus* broke into several Pieces, and the Cavity *Glenoides* was entire. There was no Luxation, the Arm was only displaced by Reason of the Fracture.

C H A P. X.

Of the Fracture of the Arm.

IT must be observed in the Fracture of this Bone, that it suffers less displacing length-ways than otherwise, on Account of the Weight of the Limb, which opposes the Contraction of the Muscles, that usually cause the Displacing. But for all this Weight, there would nevertheless be a displacing length-ways, if the Bone were fractured in its upper Part above the Insertion of the Muscle *Deltoides*; because the Force of this powerful Muscle, assisted by the *Biceps*, and the long *Extensor* of the Fore-Arm might get the better of this Weight. The displacing being little, there needs but a slight Extension to reduce it.

Operati-
on.

In performing this Operation, an Assistant holding the Arm with both his Hands, the one upon the Fore-Arm near the Wrist, and the other near the jointing of the Elbow, must raise it up gently and by Degrees, whilst the Surgeon, sustaining the two fractur'd Ends, raises them with the same Softness as his Assistant, till the Arm almost makes a right Angle with the Body.

Things being order'd thus, the Extensions must be made by two other Assistants; one whereof must take hold of the Head of the *Humerus*, and the End of the *Omoplata* with both Hands, and the other must grasp the *Humerus* near the Articulation of the Elbow. The latter drawing makes the Extension, and the other resisting, or even drawing, makes the
the

the Counter-Extension. The Surgeon being attentive to what passes, must endeavour to adapt the Ends of the broken Bones; but he must not begin this Operation till he judges the Extensions sufficient, and he must observe all that we have said, in our general Account, on this Subject.

One must use a Scarf, which should be as short as possible when this Bone is fractur'd cross-ways; but when 'tis broken obliquely, it must be ty'd loose, that the Arm may hang down, and the Weight of it may withstand the easy mounting of the Bones one upon the other: The Arm must be hinder'd from moving towards the Ribs, because that Motion wou'd cause a second Displacing. When the Fracture is in the upper Part, a roll'd Band must not be used, because the Roll of it can't easily pass under the Arm-Pit, which would oblige one to make some Motion outwards that would be very hurtful; for this Reason in these Cases they use a Bandage with eighteen Tails.

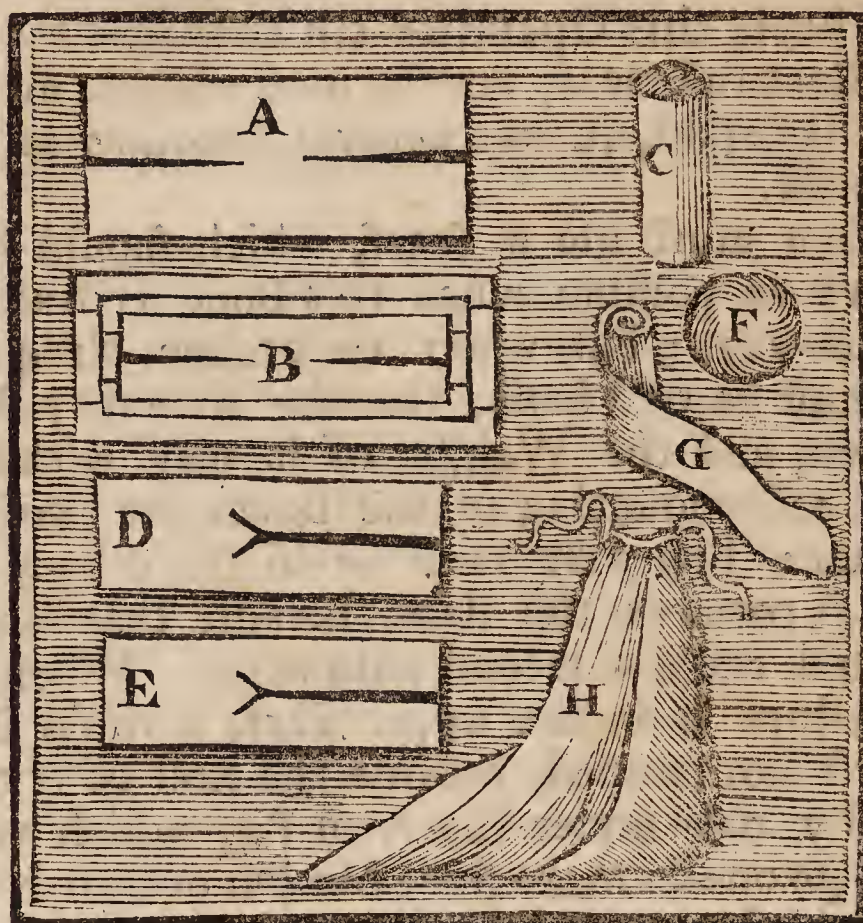
Remark
upon the
Dressing.

The Signs, the Prognosticks and putting on of the Dressing are as in the Fractures of other Limbs. See that of the Thigh, or of the Leg. The Dressings must be cut out after one of the Manners here engrav'd.

First Plate.

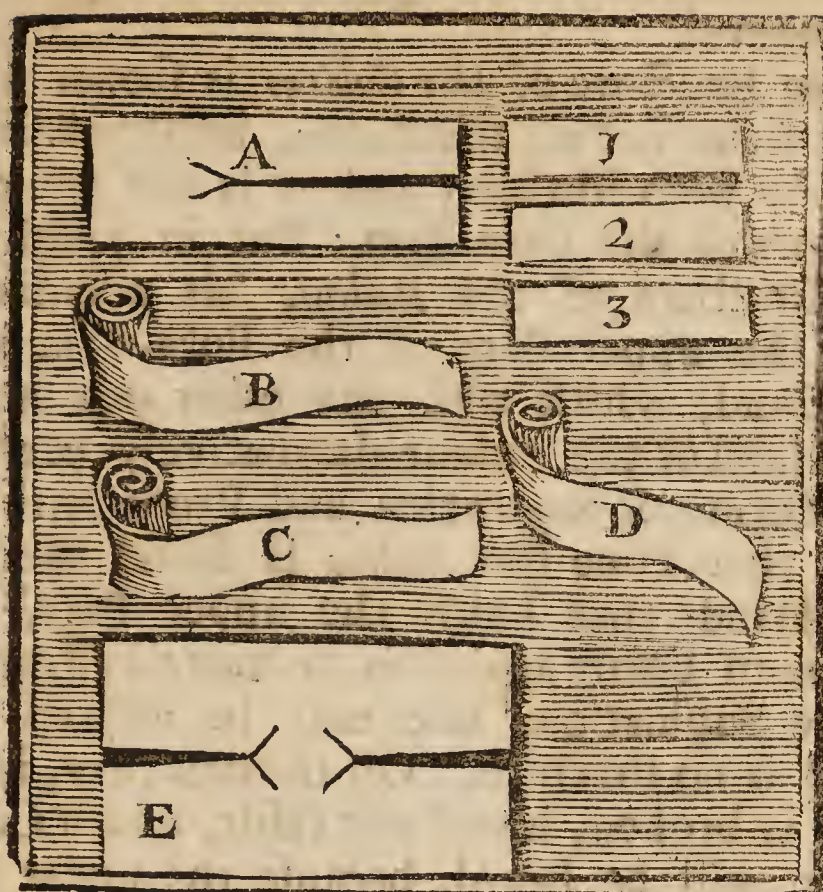
Apply the simple Compress (A) for a Fracture of the Neck, or near the Neck of the *Humerus*; and make use of the Bandage with several Tails (B) of the Compress made like a Cylinder (C) under the Arm-pit, of the two Compresses (DE) to wrap round the rest of the Arm and the Fore-Arm, of the Pellet (F)
to

A TREATISE of the
to put in the Hand, of the Roller (G) to sur-
round the Whole, and lastly of the Scarf (H.)



Second Print.

If the Fracture is in the under Part, they use the simple Compress (A) the Band (B) then another Band (C,) after this the 3 longitudinal Bolsters 1. 2. 3. they are made fast with the Roller (D,) the Fore-Arm being cover'd with the Compress (E,) and the Pellet and Scarf put on as beforemention'd.



C H A P. XI.

Of the Fracture of the Fore-Arm.

THE Fore-Arm has two Bones, the *Cubitus* and the *Radius*, which are jointed above with the *Humerus* and below with the Wrist, leaving between them a Space that proceeds from the bending of these two Bones; the one a little inwards, the other outwards. They are both join'd at their two Extremities; and the Space that is left in the Middle is wholly fill'd up the whole Length of it by a strong, but small Ligament, that adheres both to the one and the other.

They may be broken either both together, or separately: The Fracture of both may be easily

easily known by the Signs we have spoken of in General.

Signs.

The Fracture of the *Cubitus* is sooner discover'd than that of the *Radius*, because it is less cover'd with Muscles, and it is the principal Support of the Fore-Arm : But in judging of the Fracture of the *Radius*, 'tis essential to hold the upper Part of the Fore-Arm with one Hand, whilst with the other one makes the Hand of the Patient alternatively perform the Motion of Supination and Pronation ; and if at that Time the *Radius* is found to resist the Hand that holds the upper Part, and makes an Effort against it to move in Pronation or Supination, one may be assured that there is no Fracture. On the contrary, if the Bone is broken, it will not resist, and a Crepitation will be heard, because the under Part of the *Radius* in moving, will rub against the upper Part, which is kept, as it were, immoveable by the Hand that holds the upper

How the
Crepitation is
discover'd.

Remark.

Part of the Fore-Arm. This would not happen frequently, if one were only to move the Patient's Hand in Pronation or Supination, without holding the upper Part ; for it might very well follow the under one, altho' the Bone were broken, which must not be ; for there must absolutely be but one Piece in Motion, to the End that the Crepitation may be felt, or else both of them must move contrary Ways.

The Ends of the broken Bones may be displaced two Ways, either in length, by getting one upon the other, or else in thickness only, which both together are of greater thickness than the one was when whole.

As to the displacing length-ways, I know it may be disputed me in Fractures of one Bone

Bone only: But I shall prove it hereafter so as to leave no Room to doubt it.

I pass on to the Displacing in Thickness which may happen two ways. The first, is when the Bones are not entirely separated in Thickness, that is to say, that their broken Ends still touch a little: The second, is when they are brought near the *Cubitus*, which happens because the *Rotundus* and the *Quadratus*, two Muscles that help the Pronation, work together, and draw these Pieces of the Bone towards the *Cubitus*.

It must be observ'd, that these Muscles, in drawing the fractur'd Bones towards the *Cubitus*, draw them a little inwards, that is to say, on the Pronation side; which the round Muscle does with most force, because it is inserted farther from the Point of Adhesion of this Piece with respect to it alone, than it was before the Fracture with respect to the whole Bone: For 'tis known that this Muscle inserts it self at the middle part of the *Radius*, and if the *Radius* is broken at that Place, the Muscle at that Time is entirely remov'd from the Point of Adhesion, because it is quite at the End of this Piece of the Bone, which gives it more strength to draw it.

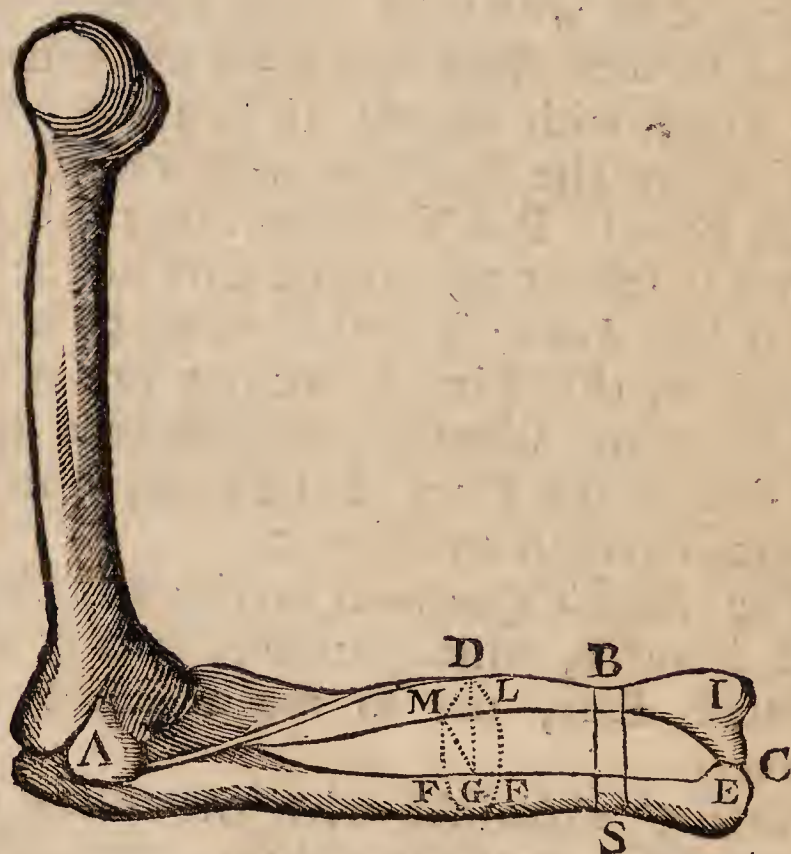
The Pieces of the Radius are brought near the Cubitus.

The Muscle *Quadratus* carries also the lower Part inwards, which however it can't do with so much Ease, nor so much Force as the *Rotundus*.

Having explain'd why the Ends of the Bones draw near the *Cubitus*, the Displacing length-ways must be prov'd, for the Adhesion of this Bone with the *Cubitus* withstands this Displacing. Nevertheless, to prove it, one need only remark that the two Ends of the Bone cannot incline towards the *Cubitus*,
U without

without approaching one another, and that if their Ends don't meet, they can't draw near the *Cubitus*: But if they are displaced in Thickness, and the Ends don't meet, then they will be brought near the *Cubitus*, which they can't do without mounting a little upon one another, because the *Radius* is a little crook'd. You need only look upon this Figure, where I suppose the *Radius* fractur'd at the Point (D) I say, first that the End (M) of the upper Part of the *Radius* will be carry'd by the Influence of the round Muscle (AD) towards the *Cubitus*, not by the right Line (DG) but by the crooked Line (DF).

Displa-
cing
length
ways.



I say,

I say, secondly, that the lower Part of the *Radius* mark'd (L) will be brought near the *Cubitus* by the Action of the square Muscle (BS) not by the right Line (DG) but by the crooked Line (DE) so that the End (L) of the *Radius* being got to (E) will be mounted upon the End (M) of the *Radius* that is got to (F) by the whole Quantity of (EF).

Observe that not one of these displacings wou'd happen, if at the End of the fractur'd Bones there shou'd be any little inequalities, sharp Ends or Splinters; because they wou'd lock themselves one in the other, and oppose the displacing; thus there are Fractures found where there is but little displacing, and consequently little Extension suffices to reduce them. Remarks

But where there is a displacing, Extension and Counter-Extension must always be made: If the Ends of the *Radius* are near the *Cubitus*, the Surgeon must bow down the Hand on the side of the *Cubitus*, that he may raise the lower End of the *Radius*, so that by this means he will make the Extension and Counter-Extension, necessary to mend the displacing lengthways; and he must press with one Hand the Fore-Part of the Fore-Arm against the Hind-Part, and with the other the Hind-Part against the Fore-Part; to the End that the Muscles that are before, being thus thrust against those that are behind, may be oblig'd to lodge themselves between the *Radius* and the *Cubitus* which they can't do without raising the Pieces of the broken Bone. Manual Operation

The second thing done by this same Pression of the Surgeon's two Hands is, that it helps the displacing in thickness, by making what we have call'd the Conformation. There

needs no precaution to prevent the Bones separating from each other, because they are retain'd by the inter-ossal Ligament.

Dressing. When they are reduced, some lay Splints upon the Ends of the broken Bones, which ought carefully to be avoided, for, far from bearing upon the fractur'd Ends, the Bands, Compresses, and Splints must be so placed as to produce almost the same Effect as the Hands of the Surgeon in reducing the Bones: That is to say, that after having put on a simple Compress, and the first Band slightly fasten'd, two thick Compresses must be laid on, one upon the internal and the other upon the external Part, which being both held on, and press'd by the same Band, thrust and make an effort against each other, by opposing themselves against the displacing of the Bones either in length or thickness, and by this means they will easily contain the broken Pieces, because they thrust the Muscles into the space that is between the Bones, which keeps the Pieces always rais'd; besides the Effort even of the Muscles in contracting themselves will act in Favour of the Bones, by the Resistance of the Compresses that oppose their external swellings, for which Reason the Compresses must act upon the middle.

Over this second Band they put a third, or they use the rest of the second, if 'tis long enough to make some Circumvolutions round the Hand, both to keep it without Motion, and to fasten a Pellet that keeps the Fingers half bent. Then they put on two Pastboards cut suitable to the Part, and afterwards they place the Hand and Fore-Arm in a Scarf; the Fore-Arm and the Hand being

being in a commodious and natural Situation, so that the Muscles be not constrain'd.

As to the *Cubitus*, 'tis observ'd that the upper Piece is always in its place, whilst the under one is brought near the *Radius* by the means of the Square Muscle, provided there is no sharp End or Splinter of a Bone that with-holds it. Of the
Cubitus.

Some there are who believe that the *Cubitus*, when fractur'd, throws it self outwards, but Experience shews the contrary; in complicated Fractures it has always been remark'd that the upper Part of the *Cubitus* is in its Place, and that the lower End is brought near the *Radius*. Besides 'tis demonstrated that neither of these Bones, nor of their broken Pieces can be displaced by removing from each other, because the inter-osseous Ligament always retains them. Observation.

The upper Part can't come near, because there are no Muscles that can draw it inwards, and 'tis impossible it shou'd throw it self outwards by separating from the *Radius*, because the inter-osseous Ligament withstands this separation.

It is not the same with the lower Extremity of the *Cubitus*, which may be brought near the *Radius* by the influence of the Square Muscle; for altho' this Muscle be design'd for the moving of the *Radius*, it produces a quite contrary Effect on this Occasion; for when this Piece of the *Cubitus* to which the *Quadratus* is fasten'd, breaks, and is separated from the upper one; it necessarily follows that it can no longer be the fix'd point of the *Quadratus*, and that therefore this Muscle draws this Piece towards the *Radius*, rather than the *Radius* towards the Piece, because the *Radius*

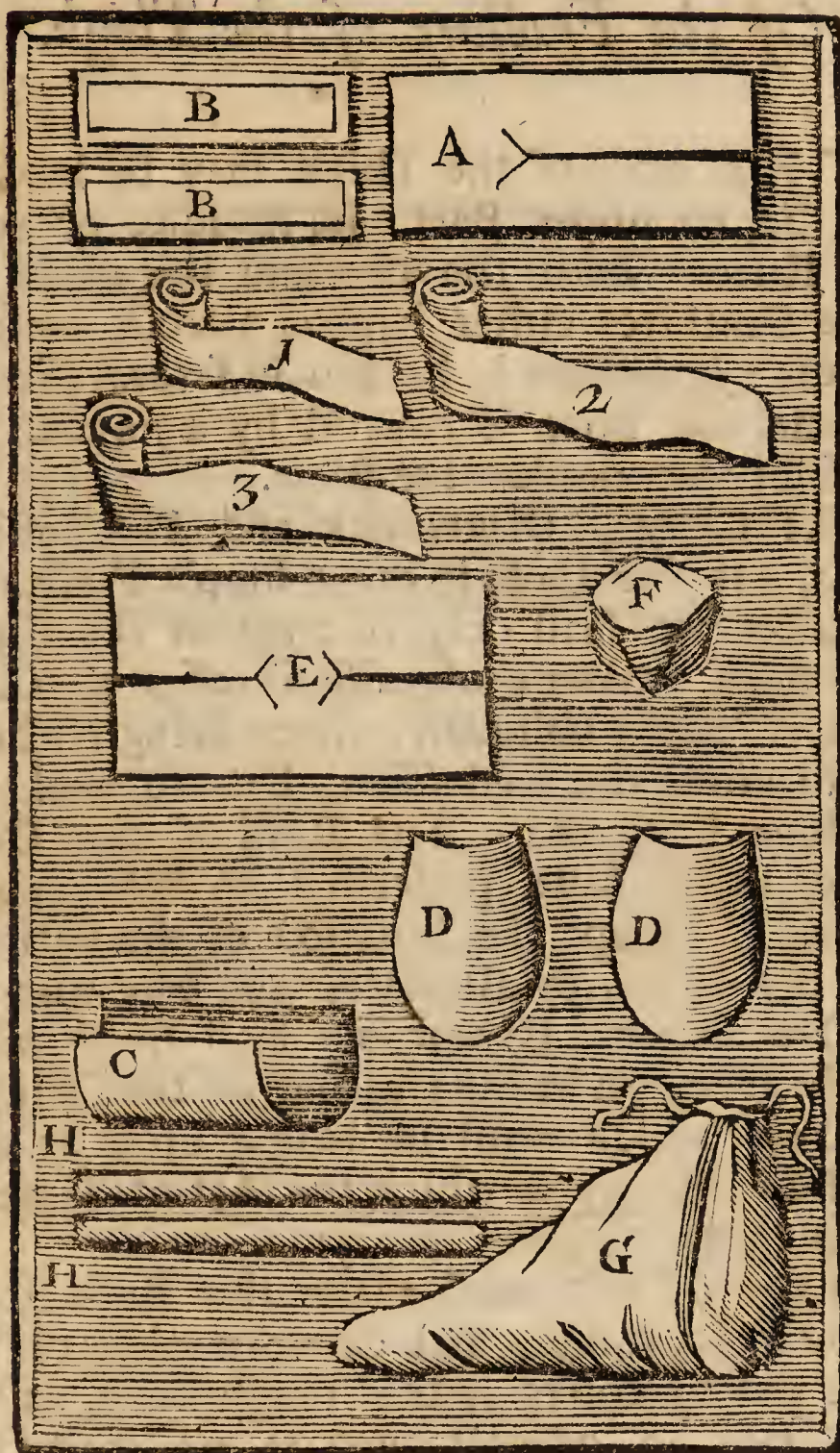
has two Points that support it, one at the Arm, and the other at the Wrist; and the lower Piece of the *Cubitus* has no longer any but that below.

As to the Reduction it is the same with that of the *Radius* with this Difference that the Hand must be turn'd towards the Thumbs to make the Extension, whilst one presses the fractur'd Part with both Hands.

The Bandage must be made as for the *Radius*, with this Exception, that there is not so much care to be taken to make fast the upper Part of the *Cubitus*, because it can only move in Flexion and Extension, which must be hindered by the Scarf.

When both Bones are fractur'd, one must observe almost the same Circumstances, which must be deduced from the structure of the Part, which ought always to be kept in view, not only in this Operation, but in all others.

The Dressing consists of a simple Compress (A) split, of two thick Compresses (BB), of three Bands (1) (2) (3) of one large Past-board (C) or two little ones (DD), fasten'd with two Straps (HH) of a Compress that surrounds the Hand (E) of a Pellet (F) to fill it, and of a Scarf (G) to support and inclose the Hand, the Fore-Arm and the Elbow.



C H A P. XI.

Of the Fracture of the Thigh.

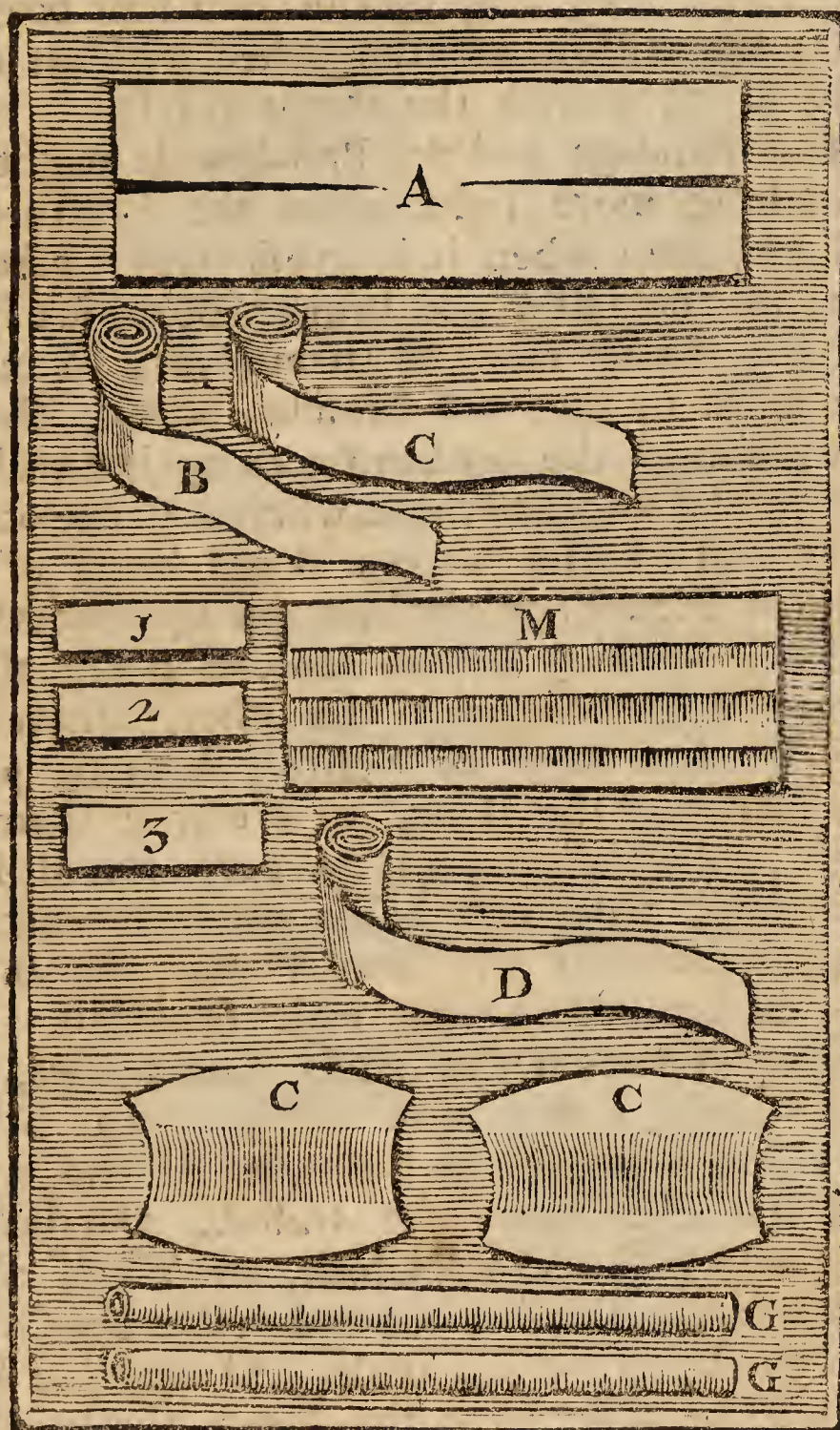
THE Bone of the Thigh may be broken in its upper Part, its Middle, or near the Knee: Both the one and the other of these Fractures either happen a-cross, or obliquely; it seldom is broken in several Pieces, because this Bone is cover'd by a number of Muscles that deaden the Blow.

The Causes, Diagnostick and Prognostick Signs, are like those in other simple Fractures, therefore we shall only of treat of the Cure. The Bone broken cross-wise is easier to Cure than if 'twere obliquely, there being nothing to do after the Reduction, but to make a common Bandage: The Rest of the Cure being as we have prescrib'd in the general Account, except the situation of the Patient, and the Ways to alleviate, and ease him in his Necessities. Hereof we shall speak very much at length in the treating of the Oblique Fracture which must be look'd upon as one of the Rocks upon which the Art of Surgery often splits.

In general one must make the Extensions, Counter-Extension, and Conformation to reduce the Fractures of the Thigh-Bone, as has been said in general, and as we shall say hereafter in the Fracture of the Leg.

The Reduction of the Fracture of the Thigh being made, the Dressing must be put on, viz. The simple Compress (A) which covers the fractur'd Part. It must be steep'd in Aromatick

mat'ck Brandy, then three Turns must be made over the Fracture with the Band (B) which is employ'd in making Trusses ascending upwards towards the Groin, then must be put on the Band (C) which also makes three turns over the Part, and Ends near the Knee in Truss.s.



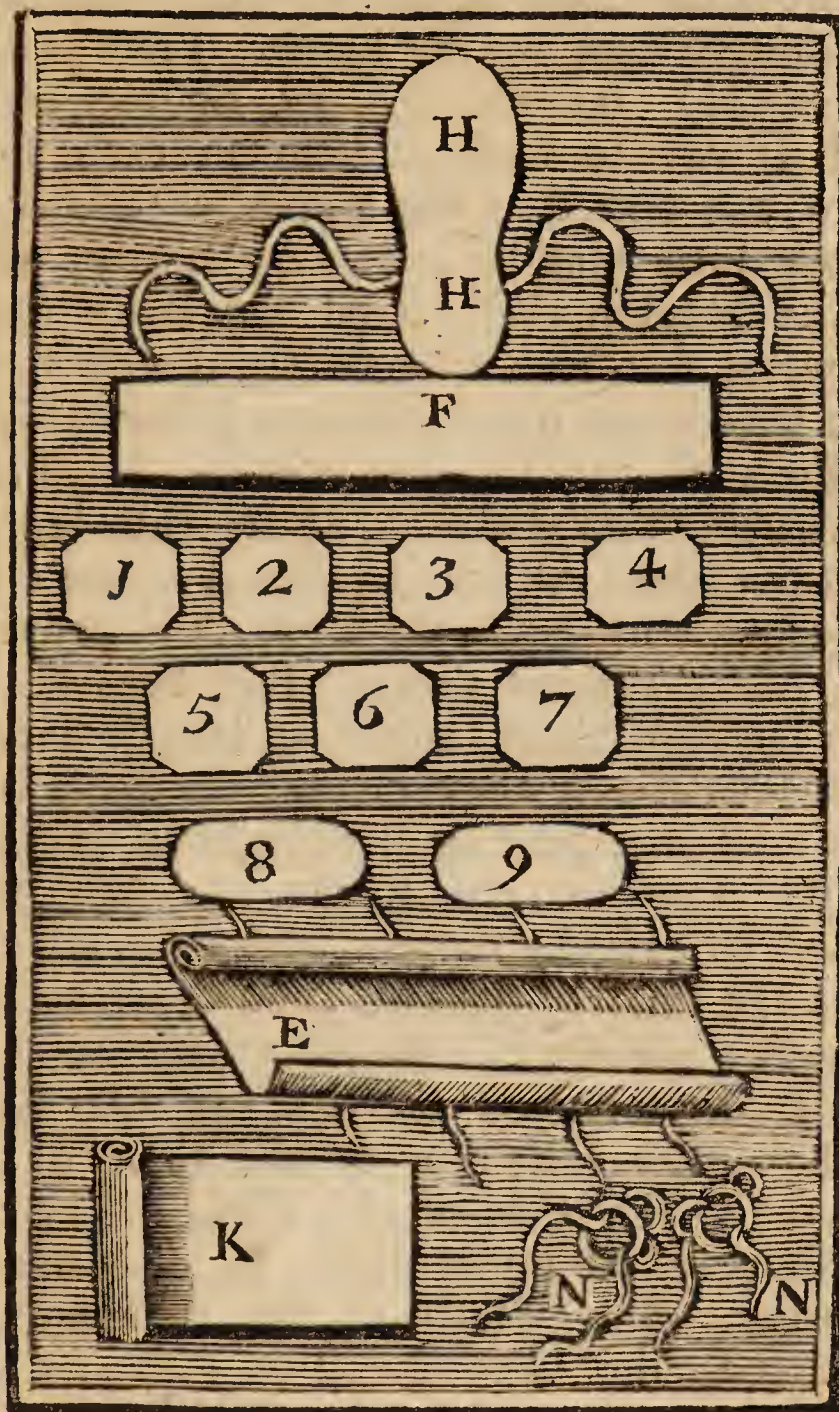
When

When the two Rollers are taken up, the Part must be equaliz'd by the graduated Compress (M) being thicker on one side than on the other; then they place the longitudinal Bolsters, 1, 2, 3. which serve as Splints, and they are made fast with the Band (D) which begins near the Knee, and ends at the Groin. This done they clap on the two Past-boards, (CC) one within and the other without and they are ty'd with the Straps (GG).

The Bandage and the Past-boards ought be something more light when the Fracture is oblique, than when it is cross-ways, because that in the latter the broken Bones are supported, as it were of themselves, so much the more in that the Muscles acting, thrust the Pieces of the broken Bones against each other, and strengthen them, whereas in the other, each End of the broken Bones being of an oblique Figure, cannot bear one upon another, and the working of the Muscles make them slip, and get one upon the other, wherefore the Bandage must be tighter, both to press the Pieces of the Bone, to preserve them in their right Position, and to keep the Muscles extended, that not being able to contract themselves with the same Force, the Bones may be retain'd in their right situation.

Having put on the Bands, Compresses, and Past-boards, one must fasten two Straps (NN) one above the Condyles of the Knee, and the other above the *Malleoli*, and besides one must pass a great Cloth, or a half Sheet between the Thighs, one end within the Groin, and the other behind under the opposite Buttock to be fasten'd to the Head of the Bed, one end on the Right and the other on the Left. This done the Junks (E) must be put on, which

which must reach the one from the Sole of the Foot to the Groin, and the other from the Sole of the Foot to the *Crista* of the *Ossa Ilia*, to the end that they may keep the Foot, the Leg, and the Articulation of the Thigh with the *Ischion* at rest, so that all that can be still, may be so.



The Junks must be trimm'd with little Cushions, or the Compressees, 1, 2, 3, 4, 5, 6, 7, 8, 9. which are to be put from the Hip to the Foot, to fill up the inequalities; and to the End that the Junks may be so well adapted as to make an equal Compression, they put on a long Compress (F) which reaches from the Foot to the Groin, over which the Straps go that tie the Junks. They put on a Sole (H) fasten'd by its double Strap, which serves to keep it firm on each side; and to the end that the upper extremity of the long Junk may be kept very steady, they pass the Napkin (K) round the Body above the Junks, to which they fix them with strong Pins; then they make fast the Knee-Strap to the Foot of the Bed, to retain the Thigh downwards, and keep it at its full length, whilst the Sheet which is fasten'd to the Head of the Bed with-holds the Body, and prevents it its being carried down. But because the Cloth or Half-Sheet might at length incommode the Patient, they change the Ends from Time to Time, putting the Right to the Left, and the Left to the Right. In the same manner, to ease the Patient, the Strap which is ty'd to the small of the Leg (and which we have not before mention'd) serves when he finds himself incommoded by that at his Knee, for then they fasten it to the Foot of the Bed, and loosen that at the Knee, doing thus alternatively as he is hurt by the one or the other. The Quilt of the Bed must be perforated, for fear the Rump shou'd gall, which might be fatal, and one has the Convenience of putting a Bed-Pan between the Quilt and the Mattress when the Patient wou'd go to Stool, and that he may do it

with

with Ease, the under Sheet is of two Pieces, which meeting at the Buttocks there is nothing to be done, but to separate them.

At the Foot of the Bed there must be a Board fixed, whereunto they nail a Billet, cover'd with a little Quilt, against which the Patient may thrust his sound Foot to ease himself, by bearing against it to raise himself from Time to Time, when having slip'd downwards, he finds himself incommoded by the Half-Sheet that goes between his Thighs; for by thrusting the Sole of his sound Foot against the Billet, he raises himself better than two Persons cou'd do it for him. The Board is also convenient when the Fracture is a-cross, because then they neither make use of Straps nor a Half-Sheet to withhold the Sick Person, and it is proper the Feet, even that which is hurt, shou'd rest against somewhat.

That the Patient may move himself with the more Ease, a Cord shou'd be fasten'd to the Ceiling, and come down thro' the middle of the Bed's Tester, within reach of his Hand, which is very useful.

One must examine the Rump very often, for in spite of all one's Care it sometime galls, and a Gangrene follows.

In this Case the Vulnerary Water is used with good success, wherewith they bathe the Part, then they clap on some *Storax* spread upon a soft Paper or fine Linnen, which is all that is particular in this Fracture, the rest of the Management is to be found in the general Account, wherein we have treated of it very much at length.

SECT.

SECTION II.

Of the Fracture of the Neck of the Femur.

TH E Neck of the *Femur* breaks either in its middle near its Head, or near the great *Trochanter*.

When it breaks near the Head, some take this Fracture for the coming off of the *Epiphysis*, and others for a Luxation, nevertheless there are signs whereby one may distinguish all these Diseases. These three Fractures have often been taken for Dislocation, There is even an Example in the famous *Ambrosius Paræus*, who was mistaken therein, and relates his Error with all possible sincerity; a sincerity very uncommon in the Age we live in, and of which we have hardly any Example since *Hippocrates*. No Man need be ashamed of his Faults but when he has neglected being instructed; a sincere Confession accompany'd with the Circumstances, 'is often more useful than such Discourses as are dictated by self Love; which serve only to render a Book as tedious for its length, as the little worth of the Work. We shou'd perhaps have fewer Volumes to read, but more obligations to the Authors, if instead of only relating their successful Practice they had only treated of their Faults.

I can't therefore forbear blaming the Author of these Books so stuff'd with frivolous Trifles, that they never make amends for the
Pains

Pains one has been at in reading them ; I blame yet more those, who, far from running this Risk, neglect the Advantage of reading such as wou'd instruct them.

Paraus had never been read by him who, having taken a Fracture of the Neck of the *Femur* for a Luxation, and thinking he had reduced the Bone, contented himself with retaining it by a simple Bandage. The acute Pains which the Patient felt after this pretended Reduction, made him doubt his Condition, and send for me to be assured of it ; He who had dress'd him affirm'd that the Bone of the Thigh had been dislocated, but I found that the Reduction had never been made because the Thigh that was hurt was shorter than the sound one. The Bandage being undone, I perceiv'd the great *Trochanter* four Fingers breadth higher than it ought to be ; the end of the Foot and the Knee were turn'd inwards, which, join'd to what had been told me, made me believe that the Bone was dislocated ; but taking hold of the Foot and turning the End outwards without Resistance, I discover'd that there was Fracture at the Neck. I reduced it, and dress'd it, following all the Rules I have laid down in the simple Fracture of the Thigh, and the Patient was cured without Limping.

Several Reflections that may be useful in Practice, may be made upon this Observation ; the first relates to the Signs, whereby one discovers the Fracture. It seems, by what I have just said, as if the easy turning the End of the Foot inwards and outwards, were the only Sign by which I found it out ; nevertheless it is not the only one ; but in the Case in Question it proved that there was a Fracture, and
that

that it cou'd only be at the Neck of the *Femur*. That this may be comprehended, I say that when a Person that is hurt lies upon his Back, exactly in a right line from Head to Foot, his Legs and Thighs stretch'd out by the side of each other, if the *Malleolus internus* of one side is higher than that of the other the breadth of three Fingers, and the *Rotula* in proportion, all this lower Extremity will be shorter than the other three Fingers breadth, which cannot happen after a Fall, but where there is either a Fracture or Luxation. Then if upon moving the end of the Foot it can be turn'd inwards or outwards with equal Ease, I say there is no Luxation, because it has been demonstrated, in the Chapter of the Dislocation of the Thigh, that, when the Bone is luxated on one side, the Muscles draw the Limb on the other, and that it can't without Pain be carry'd on the side contrary to that whither it is drawn by the Muscles, thus there is no Luxation, and there must be a Fracture.

Observe than that when the Neck of the *Femur* is broken, the Head of the Bone remains in its Socket, with part of the Neck; the *Femur* no longer having any Eminence to withhold it, nothing can hinder its turning at the will of the Hands that move it.

What deceives those who don't examine narrowly, is that in touching the *Femur*, they find it entire its whole length from the *Trochanter* to the *Condyles*; but they will be fully convinced of what I've said, when they make the Extensions to reduce the *Femur*, which they believe dislocated; for when by that means they have brought the fractur'd Part of it near that piece of the Neck that keeps
with

with the Head, which is in the Cavity, they will hear the Crepitation, and then the incredulous will be obliged to own that they have mistaken if they are Honest; this is what I had to say of the Signs of this Distemper.

As to the Cause of it, what I have seen is this. The *Sieur Colin*, a Master Taylor, and an Honest Man, having a mind to drop down from a Window somewhat high, slip'd along the Wall, holding the Ledge of the Window with his Hands; and when he thought he was come as near as he cou'd to the Pavement, that he might fall from a less height, he let go his hold, and fell to the Ground upon both his Feet, but unequally, for the right Foot came first; thus all the weight of his Body, which receiv'd a considerable addition from the swiftness of the Fall, fell upon the Right Thigh, Leg, and Foot; the Foot, Leg, and Thigh bore the shock, because the Line of Direction of the weight of the Body fell perpendicularly upon them, and the Neck of the *Femur* broke, for a contrary reason, because of its obliquity.

As to the Cure, it consists in making sufficient Extensions, and Counter-Extensions: And to keep the Bone right, one must manage as in the oblique Fracture of the Thigh, to which I refer you.

To finish this matter, I must say a Word about the *Decolement*, or coming off of the *Epiphysis*; viz. 1°. If this Disease be possible, 2°. The Signs whereby to know it, and in the 3d place way to Cure it.

First one must define this Word * *Decolement*, which is equivocal ; it may be taken for the separation of the Head from the Neck, in the Sense that one says a Criminal has been beheaded ; or else one may understand by this Word, the separation of the *Epiphysis* from the Neck, looking upon the Cartilage that is found between them as a Cement that joins both Parts.

In the first Signification, all the Fractures that are beneath the Head are comprehended, and consequently in the Neck of the *Femur*, which is that above mentioned.

Decolement taken in its second Signification, viz. uncementing or coming off, can only happen in subjects where the Cartilage that joins the *Epiphysis* is not yet ossify'd ; for in those where the Ossification is perfect, the Neck and the *Epiphysis* make but one, and if it happens that the Head separates 'tis by a Fracture, and not a simple uncementing.

There have been two Persons, within this little while, in this City, who have had a *Decolement*, one whereof consulted me ; but my Opinion was, that this was not Separation of the *Epiphysis* from the Neck, because the Patient was 35 Years old, an Age wherein the Ossification is perfect, and the Separation of of the *Epiphysis* is impossible.

That one may not be mistaken in deciding whether the *Decolement* is simple, or caused by

* I make use of the French Word *Decolement*, because tho' it is equivocal in the French, 'tis not so in the English, ungluing and beheading being vastly different. Nor is it strictly so in the French ; for the one ought to be spelt with a double ll, *Decollement*, and the other with a single one.

by the Fracture of the Neck, one must immediately have regard to the Age of the Patient; and besides observe that when the Extensions are made, as has been said in the Fracture of the Neck of the *Femur*, the Crepitation is hollow, because the Bones only touch a-cross a Cartilage; whereas 'tis clear and plain when there is a Fracture, because they touch without any Interposition. 'Tis true, this Sign is only certain when the Hurt is recent, for when 'tis of long standing, the sound is hollow even in the Fracture it self, because the Ends of the Bones are cover'd over with the Callous Matter, which has coagulated there, and produced the same effect as the Cartilage, in a simple uncementing of the *Epiphysis*.

It must also be remark'd that the Neck of the *Femur* is much longer in the Simple uncementing of the *Epiphysis*, than in the Fracture, whence they can't turn the End of the Foot inwards and outwards, with so much Ease as in the Fracture, and that this Ease is greater when the Fracture is at that part of the Neck that is nearest the *Trochanter*.

After all, of what importance is it to the Cure, to distinguish the simple *Decolement*, or ungluing from the *Decolement* by a Fracture, since the Operation is the same, and there is no difference in the means of supporting the Bones when reduced? We have described them amply in treating of the Simple and Oblique Fracture of the Thigh, wherefore I shall say no more.

SECTION III.

Of the complicated Fracture of the Thigh.

ALTHO' Fractures may be complicated in their Causes, as when a Musket-Ball is lodg'd in a Limb, after having broken or splinter'd the Bones, or tho' they may be complicated in their Accidents or Symptoms, as Pain, Convulsions, &c. Nevertheless, when one says, that a Fracture is complicated, Custom has brought it to signify a Fracture with a Wound; 'tis in this Sense that I treat of the complicated Fracture of the Thigh, having sufficiently discoursed of the Causes of Complication in the general Cure of Fractures.

The Wounds which accompany the Fractures of the Thigh-Bone are in general of two Sorts; the one are produced by the Cause it self that broke the Bone, as by a Coach-Wheel, a Musket-Ball, a Splinter of a Bomb or any other; the others are caused by the Bones themselves that are broken, as when they pierce the Muscles, the Fat, and Skin: Both the one and the other are attended with more or less Contusion, have or have not a *Hæmorrhage*, are with or without extraneous Bodies, the Bones are sometimes not uncover'd, sometimes they are, and even issue out thro' the Wound.

The Diagnostick Signs don't at all differ from those whereby other Fractures are discover'd.

Of the Prognostick.

Of all complicated Fractures that of the Thigh is the most troublesome; it is hard to keep the Bones in their place, especially when they are broken obliquely. 1st. The Bone is single, has but little surface in its middle, and besides a great number of very strong Muscles that surround it on all sides, cause the broken Pieces to mount easily one upon't other. These same Muscles oppose their Reduction, and often displace them, even after they have been well reduced.

2^{dly}, The necessity of moving the Patient for his Occasions, is a great Obstacle to the Reunion of the Bones, which requires a perfect Tranquillity. Remark.

3^{dly}, The Thigh is cover'd with so much Flesh, that 'tis almost impossible to preserve the Incisions in that extent which is proper for leaving the broken Bones bare as long as is necessary, for obtaining Exfoliation. Remark.

The Muscle *Fasciata*, which in all De- Remark.
fluxions causes so many Disorders, is here the source of an infinite number of Impossumes.

When the Wound is in the lower Part, this Disease is yet more fatal, in spite of all the ways taken to prevent displacing the Bones in dressing the Wound; and one has often the vexation of seeing Patients die under one's Hands, for whom (as I may use the Expression) one has tired out the Patience, and exhausted all the Remedies in the power of Art.

When this Fracture is so near the Joinings Fracture near the
that the Articulation is inflam'd, and De- Joints
fluxions happen there, 'tis very rare that
one succeeds, and the Patients perish by a

Vomiting and Looseness, a slow Fever, and the Reflux of purulent Matter, which causes Abscesses in the Liver, the Lungs or some other of the Intestines.

When the Fracture is near the upper Articulation, it is still more Dangerous.

Of the Cure.

That Pupils in Surgery may be instructed with the more Ease in this matter, I will take the principal Examples, to which I will add particular Observations that will help to clear up their Doubts; and I will give them a Reason for all that I shall teach them in this Cure, which is apt to perplex the most experienced Surgeons.

For Instance.

Observations.

A Man had his Thigh broken by a Kick of a Horse, which had cut part of the *Extensors* of his Leg, without having broke the Skin; I made the Reduction as I have directed in the Article of the simple Fracture, excepting that I did not use a roll'd Band, but a Bandage with 18 Tails, as I mention'd in the same place and elsewhere. Compresses steep'd in Spirit of Wine camphorated, and Aromatick Brandy were of great service, as were plentiful and repeated Bleedings, till the Diminution of the Pain and Tumour made me look upon what remain'd in the Mass of Blood as absolutely necessary for the Life of the Patient; besides this, making him observe a proper *Regimen*, I had the satisfaction of seeing the *Ecchymosis* soften and disperse, and the divided

divided Flesh and broken Bones grow firm, which was follow'd by a successful Cure in two Months time.

Things are not always attended with such Observa-
good luck; I have often been oblig'd to make tion,
an Incision to open Contusions of this sort,
which happen when the Effusion is consider-
able, when the Subject is Cacochnick, or
when the Effusion is at the very place that
is fractur'd, and the Ends of the Bone are
soak'd in the diffus'd and coagulated Blood.

It must also be remark'd, that if the Effu- Remark.
sion be of the Blood alone, it does not so
often Heat, Ferment, or turn into a *Sanies*,
as when the *Lympha* is intermingled with it:
One generally sees that it disperses in the in-
terval of the Muscles, and in the *Sacculi Adiposi*,
which forms the *Ecchymarpsis* outwardly of a
black Colour, which disperses by degrees, by
changing from black to a dark Colour, from
that to Blue, and from Blue it turns by
shadows to an Orange, and so to a clear Yellow,
till at last it becomes of the natural Colour of
the Skin; then they leave off the Bandage
with 18 Tails, and put on a Roller as in simple
Fractures. If such Effusions happen over a- Observa-
gainst the Fracture, they must be open'd if tion.
they are considerable; Bandages wou'd be use-
less, and cou'd not retain the broken Bones,
because they cou'd not bind them near e-
nough.

When one has been oblig'd to open the Observa-
Tumour, if 'tis not at the place that is tion.
fractur'd, the Wound must be dress'd, as
is convenient, making use of the Bandage
with 18 Tails till the Wound is closed, and
afterwards of a Roller.

Observa-
tion.

Remark.

If the Defluction is at the very place that is fractured, and the Bones are bare, they examine whether they are in their right place, and whether there is a Disposition to a Reunion, in which Case they don't make use of Stopples: Pledgits doubled in two, or any other soft Lint is sufficient. If it suppurates well, and not in too great Quantity, and no Accidents happen, the Reunion will be made, the Bones that have not suffer'd furnish without trouble their Contingent for the Formation of the *Callus*, and when the Wound is closed, they put on Rollers, if 'tis still necessary, to support the Bones. If on the contrary 'tis found that there is any displacing, and that the too great, or too irregular Crash, takes away all hopes of Reunion, then one must manage as in the following Example.

Second Example.

A Labourer fell from a Scaffold with a piece of unhewn Stone, which he was holding; he came to the Ground a little sooner than the Stone, because having quitted hold of it, it was detain'd a Moment upon the side of a Plank, from whence it fell upon his Thigh, from above 30 Foot high, and made a very large Wound, thro' which I touch'd the Bones. I advis'd Amputation, because the Crash was as considerable as the Contusion, and tearing of the Flesh; and that moreover the Patient had not wherewith to provide all that was necessary for such various Dressings, and Conveniencies as are requisite in such a Cure. Nevertheless I did all that I cou'd to preserve his Thigh, hoping he would be assist'd and reliev'd in his Wants. I caus'd him to be
put

put into his Bed, (which was first equaliz'd) with the Part that was hurt, near enough the Bed-side, to render the Operations and Dressings easy. I put a Handkerchief, or square Cloth, within the Groin, which was ty'd by two diagonal Ends, to make a Loop that was taken by an Assistant, who held it without moving; then I made a second grasp the Manual Thigh with both Hands above the *Condyles*, Operation and a third took the Leg: This done, I made them draw a little, not so much to reduce it, as to give the Thigh its due streightness, a Circumstance that ought always to be observ'd before the Operation is begun, both because the Motions excited by Pain are less hurtful, and because to make an Incision the Parts must be as much as possible in their natural Situation.

My Finger being introduced into the Wound, was the Conductor of the *Bistouri*, wherewith I cut all the dilacerated Parts above and below, which facilitated the evacuation of a great deal of Blood already coagulated, and the taking out of divers pieces of Bones separated from their Original. I discover'd with the same Fore-Finger, the Stays which the Parts leave by their separation, and I cut them all, especially those that are always form'd by the *Aponeurosis* of the *Fascia lata*, which ought to be cut asunder, without any other apparent Reason than the fear of Defluctions; that never fail accompanying the Obstructions caus'd by the Inflammation of this *Aponeurosis*, and the Swelling of the Muscles which it covers; which Swellings also happens at the same Time.

This done, I made them compleat the Extensions, whilst I guided the Bones with my Fingers,

Fingers, and replaced them in proportion as they drew the Limb.

Effect.

'Tis not secure in this Case to suffer the Bones to be again cover'd with Flesh, for which Reason I dress'd the Wound with dry Lint, and Linnen Rags, so as to keep them bare till the Exfoliation; the rest was apply'd, I placed the Part affected, and bled the Patient twice in 12 Hours, and next Day a third time before the taking off the first Dressing: At the third Dressing I left the Linnen Rags that I had put on, near the Bone; so that the Ends of the Bones were (if I may so say) wrap'd up in them, and not in a condition to hurt the Flesh by their sharp Points, they were even fastn'd on that they might not be displaced by slight Motions.

At the third Dressing I took off all, and clap'd on great Dossels, which had the same Effect on the Bones as the Linnen Rags; they were steep'd in Brandy, and those which fill'd up the rest of the Wound, were arm'd with a simple Digestive, quickned with a little Brandy. The whole was cover'd with Compresses, and a proper Bandage, as shall be very exactly describ'd in the complicated Fracture of the Leg.

Third Example.

I cou'd give great numbers of Examples of this sort, but I have chosed only those wherein I have found the greatest number of Circumstances met together, and I hope it will be sufficient to clear up this matter entirely. The present Case is of a Fracture of the Thigh, made by Gun-shot: Two Balls were entred in at the middle of the Fore-Part of the

the Thigh, whereof one went out at the middle of the Hind-Part, an Inch lower than where it entred, and the other remain'd in the Thigh. The *Femur* being broken into several Pieces, and a considerable *Hæmorrhage*, might have determin'd us to an Amputation, if the Patient had not shewn all the Resolution, and all the Courage that is necessary to bear up patiently under the Pain of the Dressing, and the fatal Accidents that happen during the Course of so long a Sickness; wherein one is less certain of a Cure in endeavouring to preserve the Limb, than in resolving to cut it off.

I cut open the Patient's Breeches, and straiten'd his Thigh, which was bent, by his Fall after receiving the Shot, like a broken Stick; I tented the Wound with Lint, which I fasten'd on with a Band; after which they made a Litter, and he was carry'd into his Tent, and laid upon his Field Bed, so as to facilitate the necessary Operations. The Dressings being all ready, I made them hold the Foot, draw the upper and lower Part of the Thigh as has been said above; then carrying my Finger towards the broken Bones, I compleated the Dilatation at the Bottom, and made that at the Top, being conducted thro' the whole by my Finger. I drew out thro' this Wound a great deal of clotted Blood, which discover'd the opening of the Vessel, whereon an Assistant put his Finger, whilst I dilated the Wound behind, by causing the Thigh to be a little rais'd, and turning the Patient on his sound Side, I drew out but little clotted Blood by this new opening, which I made larger, but got a great many fragments of Bone, and bits of the Cloth of the Breeches, that the Balls had

Manual
Opera-
tion.

Remark.

had driven in. I then search'd for the second Ball, and found it in the *Vastus Externus*, near the Skin, and the small Head of the *Biceps*, about an Inch on one Side of the Place where the other Ball went out. To extract it I made no difficulty of cutting the Skin and Muscles a-crois from the Inside to the Outside, from the place where the Ball that made the Wound went out, to that thro' which this wou'd have issued, had it continued its Way. One may without fear of diminishing its action, and without danger, cut a-crois such little Parts of so large a Muscle as the *Vastus Externus*.

Having made what Dilatations were proper, and drawn out all the extraneous Bodies, I replaced the Thigh in its right position; then I made the Finger be taken off the Vessel, and pass'd a crooked Needle with a double Thread of that sort, call'd *Fil d'épinay* from Top to Bottom, and again from Bottom to Top, and ty'd the Vessel in a double Knot. I cut off the Thread within two Fingers of the Vessel, and laid upon the Knot a Compress of an Inch Square, and four Lines thick; I trimm'd the Wound with Dozels, and especially the Ends of the Bones, as has been said in the foregoing Example; then I put over them a Compress four double, and apply'd the Dressing proper for complicated Fractures.

Remark useful for young Pupils.

When the Vessel is not situated in a place convenient for the Passage of a Needle, they make use of a Dossil steep'd in Styptic Water, well squeez'd out, that this Water may not spread over the Wound, because it is both

useless

useless and hurtful there. In applying this, they wipe the Part well whence the Blood issues, and they clap on the Dossil steep'd, at the very instant that they withdraw the Linnen that has wip'd the Vessel; the one must be placed immediately upon the removal of the other, because if the least Time be lost, the Blood that issues out weakens the force of the Styptick, wherewith the Dossil is impregnated, which hinders its Operation. Upon this they put a Compress like that which was upon the Ligature, and support it in the same manner by a number of Dossils, which they raise a Fingers breadth above the Level of the Wound, to the End that the Compress which is laid over it, and the Bandage that contains all, may compress this part more than the rest, without which the Dossil wou'd be forced off by the Effusion of the Blood, and the *Hæmorrhage* wou'd begin afresh.

If the Vessel shou'd be near the Bones, it must be stop'd by compressing it, so as that among the Dossils, there may be one that may press upon it above, whilst the Bone resists underneath. The Dossils must not be steep'd in Styptick Water, but they must be rais'd in the same manner a Fingers breadth above the Wound, and the rest must be apply'd as above.

If one does not use Styptick Water on this Occasion, 'tis because one ought to be apprehensive of laying the Bone more bare than was done by the Fracture. It ought also to be avoided if the Vessel shou'd be near the Tendons, Nerves, or other sensible Parts: Compression must, as much as possible be prefer'd to the Ligature and to the Styptick; when the
Vessel

Vessel is not considerable it always succeeds; but when it is the Ligature ought to be preferred: And if 'tis impossible to put that in Practice, the Stypticks must be us'd not only liquids, as the Styptick Water of *Rhabel* or any other, but even Solids, as Buttons of Vitriol.

You wou'd perhaps be at a Nonplus if a Vessel were open'd at a distance from the Bone, and in a place where the Ligature were impracticable, and the Stypticks dangerous. To determine you, remember that all other considerations must be past by when the Business is to stop the Blood, therefore don't be apprehensive of touching the Bones, the Tendons, nor the Nerves, but of your Patient's perishing thro' loss of Blood, and even if you had neither Needle nor Styptick, your Genius and Sagacity will furnish you with a ready Way to Stanch the Blood by the Compression alone: The Genius of a Surgeon must find him Resources every where, even in places where Nature seems to have deny'd them.

Having thus provided Remedies for the *Hæmorrhage*, drawn out the extraneous Bodies, replaced the Bones, trimm'd their Ends that they might not hurt, dress'd the Wound, apply'd the Bandage, that shall be describ'd in the complicated Fracture of the Leg, having prescrib'd all that had regard to the Regimen, it was necessary to provide for the Transportation of the Patient from the Camp where he was, to the neighbouring Town. To compass this without danger, I had two long Sticks made, of an Ash which I order'd to be fell'd, and fitted to the Field Bed whereon the Patient lay, the two Ends passing behind
and

and before in the shape of a Litter, which was laid upon two Mules, and carry'd softly to the next Town. The Mules were unloaden, and the Bed was carry'd into a low Parlour prepar'd for this purpose, and there I thought of all that was necessary to dress the Patient conveniently, and procure him a way to satisfy his Occasions with Ease.

To succeed in this important Point, regard must be had to the situation of the Part, and of the whole Body; the Part ought to be in safety, and the Bandages such as can be undone and clapt on again without stirring the Limbs; for this reason in a Fracture of the Thigh, where there is a Wound underneath, I advise not to Sow the Bandage with 18 Tails, but let all the Pieces be separate; so that there may rather be a Band with Nine Ends, than a Bandage cut into Eighteen, that these Ends of the Band may be chang'd altogether if requisite, or each by it self, as there is occasion.

Secondly, The Longitudinal Bolsters that are placed at the lateral Parts, must be thicker than those used in other Fractures; they must be large enough to take up, both within and without, as much as possible of the under Part of the Thigh, and they must come near each other at the upper Part, not leaving above one Fingers breadth from one another.

Past-boards are not the best Things to retain the Bones, I prefer Splints of Tin varnish'd, or the Bark of a Tree, because moisture softens Past-board, and then it no longer supports the broken Bones. Tin varnish'd or the Bark of a Tree are firm by their substance, and the Tin resists Moisture by its varnish. They make them of a shape agreeable to that

Dressing that is preferable.

that of the Part, and trim them with Compresses that they may not hurt, which done they tye them on with two or three Thread Straps of a Finger's breadth.

As to Junks or a Case, I know that each of them has its admirers, for which reason 'tis fit to relate the Qualities both of the one and the other, and leave you to your Choice.

The good
of a Case,
and of
Junks.

The Case seems most secure, because being of Wood 'tis inflexible, but Junks well made have only a pliantness that is useful, and does not go so far as to allow the displacing of the Bones: I say more, atho' the Case be firm it does not so well support the broken Bones, because it is not ty'd with the rest of the Bandages; whereas the Junks are made fast with Straps. Nevertheless one may give a Case, this advantage by adding Straps to it.

They who prefer the Case say, that it forms an even Surface, and that on the contrary the Junks give way and conform themselves to the unevenness of the Bed, but they don't reflect that the equality of the Surface of this Case is a Defect, because it can't suit with the inequalities of the Heel, the Calf of the Leg, the *Condyles*, and the top of the Thigh. That if they endeavour to help this by Quilts, this Remedy is not sufficient because the Heel, the Calf of the Leg, and other places that stick out, will always bear much more upon them, then the places that sink in; these inconveniences are not found in the Junks provided one observes.

1^o. That they have a great deal Surface, except in the End that approaches the Pudenda.

2^o. That the Cloth which covers them make a great many Circumvolutions round the

Straw

Straw whereof they are made, to that degree that the Inequality may be taken away.

3°. That there be two Cloths to trim them, viz. One that covers them from that Part of the Junks, which is above the *Condyles* of the *Femur* to the bottom, and the other to wrap round them four Fingers above the Fracture to the Top; so that when they are put on, there will hardly be any of the Cloth of the Junks in almost all the hind Part of the Thigh, which will render the Dressings easier, as will be seen by the sequel. That these two Cloths be cut after such a manner, that what goes round the Junks be proportionable to the length of the little Junk plac'd on the inside, and of the long Junk placed on the outside; for the latter must go beyond the *Trochanter*, and both the one and the other below must reach only a Fingers breadth beyond the Sole of the Foot.

4°. The Junks must be fasten'd on, and trimm'd with Compresses, to fill up the empty spaces, to the end that they bear equally upon all the Parts, except those that are painful, and especially those where the Wound is.

5°. The Compresses must be placed so that the Ankles, the *Condyles* of the *Femur*, the *Trochanter*, and the Groin be not compress'd.

6°. There must be a Compress half a Finger's breadth thick, and four broad, to go the whole length of the Thigh, the Leg, and part of the Foot, that the Straps may not hurt when they fasten on the Junks.

7°. The Junks must be bound so that they may be mostly under the Part, that is to say, that the Limb rests upon them, and is not enclosed in them.

8°. There must be fix Straps, three to the Leg, and three to the Thigh; those of the Thigh must be first ty'd, and those of the Leg afterwards, beginning both in the one and the other by that in the middle.

9°. They place a Wooden Sole trimm'd with Linnen and two Straps, one great, one little: The great one must pass thro' Holes made in that Part of the Sole which is over against the Ankle, and the little one thro' other Holes, which must be at that Part of the Sole whereon the first Articulation of the Toes bears. The first Strap must be equally divided into two Ends, which after making a *St. Andrew's Cross* upon the Instep, must be fasten'd to the Junks within two Fingers breadth of the Ankle; after which they must again cross each other several Times, and be fasten'd to the Junks, with Pins, forming as they cross each other Lozenges, as far as the upper Part.

The little Strap also crosses it self once at the Top of the Foot; and its two Ends must be fasten'd to the Junks, near the place where the great Strap was made fast at first.

10°. There must be other Junks a great deal softer, and with more Linnen upon them than the others, not cover'd with one Cloth, but separated, they are properly two *Cylinders*; they must be put underneath: The Straps of the inner Junks must go under, and come outwards, and those of the outward Junk must go under, and come inwards, so as to be fasten'd one to the other upon the Limb, to hinder their separation, which is essential, because they serve as a support to the true Junks; we will call these false Junks. Things being thus, the whole under Part of the Foot, Leg,
and

and Thigh will touch the Quilt but little or not at all, and will only rest upon the Cloth of the first Junks, as upon a Hammock, wherein the whole under Part of the Heel, Leg, and Thigh are mounted, except the Place of the Fracture, as has been said above; 'twill be seen by the sequel how advantageous this management is to facilitate the Dressings.

For the rest, there must be a Cord at the Cieling, a Board and a Billet at the Feet of the Bed for the uses before mention'd. I pass on to the means of procuring the Patient the Convenience of going to Stool, making Water, and taking his Drink and other Food.

There must be two Quilts, the one entire, and the other of several Pieces which may be adapted to each other, and taken away as need requires. One large Piece must reach from the middle of the Buttocks to the Head of the Bed, the rest must be divided into four Pieces, two on each side; the one on the side that is hurt must begin where the upper part just mention'd ends, and must reach four Fingers breadth below the Fracture, and the other must begin from this, and reach below the the Foot; the two other Pieces must do the same on the sound side, excepting that they must be larger according to the bigness of the Bed, so that it must consist one third of the Pieces that support the Part affected, and the two other thirds of those that support the sound side.

When the Patient wou'd go to Stool, one must remove the middle Piece on the sound side, then one Part of the Thigh and the Buttock of the Part affected will be without support, and the Place that was taken up by this Part of the Quilt make room for the Be-

Pan which may be given the Patient, and removed when he has done with it.

That the Piece of the Quilt may be easily replaced, there must be two narrow Girths, or Boot-Straps sow'd to it, which pass under that part of the Quilt that is on the wounded side; these Girths must be so drawn by one as not to move nor change the place of that part of the Quilt that supports the Fracture, and whilst they are so drawn, others take care to facilitate the replacing of this part of the Quilt that has been removed.

If one wou'd give the Patient a Clyster, this part of the Quilt must be again taken away, and that which is under the rest of the Thigh and Leg of the same side; the Patient must be made bend his Knee, the Sole of his Foot resting upon the second Quilt, he removes his Knee as much as he can, which leaves all the space that is proper between the Thighs for the introducing of the Pipe, and the management of the Syringe.

When the Patient has taken the Clyster, only the lower part of the Quilt must be replaced, whereon they put the Patient's Leg, and they slide the Bed-Pan under, that he may give back his Clyster, which when he has done, they replace the other part of the Quilt as has been said.

Each of these four Pieces of Quilt must be wrap'd in Cloth, which serves as a Sheet, and is more convenient, because a Sheet makes folds that might be troublesome. The upper Part of the Quilt is cover'd with a Cloth or half Sheet, which having no communication with the four other lower Pieces, does not at all hinder one in removing or replacing them, these Cloths must be chang'd when they

they are dirty, and be wash'd, to keep the Patient clean.

To dress the Wound they draw away the Piece of the Quilt which is under the Fracture, and has like the other two Girths or Boot-Straps that go a-cross the Bed under the opposite Piece; these are long enough, not only to give Liberty to remove the Piece of the Quilt, but also to leave Ends sufficient to take hold of again, and draw them back, when one would replace the Quilt after the Dressings.

When this Piece of the Quilt is drawn away, the broken Piece of the Thigh is entirely open, and there is Liberty to put ones Hands on all Sides to take off the Dressing, and lay it on again without running the Risque of disturbing the Fracture; then the Straps of the false Junks must be loosen'd, and whilst one raises gently all the Limb supported by the true Junks, the false ones must be taken away, and the Limb be laid down bound in these Junks.

Two Assistants must hold, one the Foot, and the other the Top of the Thigh, only to preserve its Streightness, and oppose the Startings and other involuntary Motions of the Patient; they untye the Straps of the true Junks, keeping in its Place that which is on the inside, and unrolling that which is on the outside, to unwrap the two Cloths that surround it; they draw the upper Cloth a little upwards, and the lower downwards, to give more Ease; they untye the Past-Boards, or Tin Plates, and they take off conveniently all the Dressings, observing not to touch the Compress that is laid upon the Ligature of the Vessel, or upon the Button or Dossil that has been made use of to stanch the Blood; for, in the Example that I have given, there was a *Hæmorrhage*.

The whole Dressing being taken off, the Situation and Figure of the Bones must be examin'd, that they may be remedied by replacing, if they are separated, and by cutting their sharp Ends with the incisive Pincers, if they are like to prick the neighbouring Parts; then one must dress the undermost Wound first, because the Medicines that run down from the upper Wound when 'tis dressing are retain'd, and don't spread as they wou'd do, if it were dress'd before the under one.

It must always be observ'd, in dressing both the one and the other, to cover and wrap round well the Ends of the Bones with fine Linnen, or Pledgets steep'd in Brandy; and especially not to disorder the Compressees or Dossils that compress the open Vessels. The rest of the Dossils or Pledgets must be arm'd with a simple Digestive, only quicken'd with a little Spirit of Wine, or good Brandy. Both the one and the other must be encompass'd with a Compress steep'd in Brandy; then one must lay on the 9 Ends of the Bands, instead of the Bandage of 18 Tails; after this the longitudinal Bolsters, the Past Boards or Tin Plates varnish'd must be clapt on, and fasten'd with their Straps; the upper and lower Cloth that was a little remov'd, the one upwards, and the other downwards, must be brought back and carried near each other to fasten it as it was, the Sole must be replaced, and the Limb rais'd to put on the false Junks, which must also be bound on as they were: This done, the Piece of Quilt that was taken away to facilitate the Dressings, must be restor'd to its Place. If the Space that this Piece of Quilt leaves in the Bed should not be sufficient to facilitate the Dressings, a like Gap may be made in the under Mattress,
and

and even in the Straw-Bed, that one may have all the Liberty that can be desired.

I don't know any more convenient Way of dressing the complicated Fractures of the Thigh, it seems to me to answer all the Ends that can be proposed in this melancholy Distemper, which, as I have said, is less dangerous when the Limb is cut off, than when one endeavours to preserve it: If any Doubt remains, you may have Recourse to the Fracture of the Leg both simple and complicated.

C H A P. XIII.

Of the Fracture of the Rotula.

TH E *Rotula* is fasten'd at Bottom to the Protuberance of the *Tibia* by a strong Ligament, which has been taken, but without Reason, for a Continuance of the *Aponeurosis* of the *Extensors* of the Leg: At its upper Part, the same *Rotula* gives Insertion to the strong *Aponeurosis* that is form'd by the crural Muscles, the *Rectus Anterior*, and a Part of the two *Vasti*; so that when the Leg is either stretch'd out or bent, the *Rotula* follows the Determination and Motion of the Muscles.

If our Knee is bent, it is observable that the *Rotula* is drawn downwards by the Weight of the Body, which influences the Ligament that keeps the *Rotula* fasten'd to the *Tibia*, and that it is at the same Time drawn upwards by working of the *Extensors*. If the *Rotula* can resist these opposite Determinations it will not break, on the contrary it will, if it cannot

Y 4

withstand

withstand them. That what I have said may be the better understood; I suppose that a Cord is fasten'd to a fix'd Point, as a Cramp-Iron fix'd in a great Wall, and the other End of it to a Horse's Shoulders: Suppose again that the Horse draws this Cord with a Hundred Degrees of Strength, I say, that they will endure the Effort of almost 200 Degrees, because the Resistance of the Cramp-Iron is equal to the Force of the Horse; and if there be any weak Part in this Cord that can't withstand 200 Degrees of Force, that Place of the Rope will break. In the like Manner, suppose the Weight of the Body that acts upon the Leg when bent, makes an Effort to draw the *Rotula* down, whilst the *Extensors* strive to draw it upwards; I say, that if any Part of the *Rotula* be too weak to oppose both these Powers, it will break in that weak Part, so that the *Rotula* will make two Pieces, the one kept fix'd to the *Tibia* by the strong Ligament beforementioned, and the other carried upwards by the Influence of the *Extensors*. 'Tis plainly seen that if in any violent Fall, the Line of Gravity falls upon the Leg, and the Leg be bent, the *Extensors* will strive to sustain the Weight of the Body, and the *Rotula* at that Time will be kept below, by Reason of its being fasten'd to the Leg, altho' the Muscles strain to draw it upwards. The Forces being equal, and contrary to each other, it will remain at Rest, provided the Tendon and the Muscles have Strength enough to bear up against the Weight of the Body; if not, either the Ligament that fastens the *Rotula*, or the Muscles that draw it upwards, or the *Rotula* it self must break. It will remain at Rest, because the Powers are equal; but as the Ligaments and the Muscles are less brittle, they

they continue entire, the *Rotula* breaks, and the Piece on the upper Side is carried away by the Muscles. I have seen several *Rotulas* broken by false Steps and Strains, without their having been struck at all; and if at any Time the *Rotula* appears to have been struck, one ought not to accuse the Blow of having made the Fracture; it would never break, if it were not drawn strongly upwards, and retain'd below, as we have said. What I shall say hereafter in speaking of the Rupture of the Tendons, will better prove what I advance.

The Fracture of the *Rotula* is easy to be discover'd, the Finger need be only laid upon the Knee, and the Separation of the upper Piece may be felt; and if it is carried up considerably by the Action of the Muscles, it is easily perceived by the Touch. The lower Piece neither mounts up nor falls down, because it is not fasten'd to any Muscle, wherefore 'tis easier to be found than the upper Part.

According to what has been said, the *Rotula* almost always breaks a-cross, and it is impossible it should break long-ways, unless the Fracture be complicated, as when 'tis broken by a Gun-shot, a Splinter of a Bomb, an Axe, a Club, &c.

When the Piece that is mounted upwards is but small, it is harder to distinguish the Fracture, but 'tis less dangerous, tho' more difficult to reduce; because that it not uncovering so much of the Joint, gives less Room for the nutritive Juice that forms the *Callus* to diffuse it self in the Articulation, which would cause an *Anchylosis* of the first Kind; for 'tis almost an inevitable Consequence, in all Fractures of the *Rotula*, for the Juice that flows from the two broken Ends, to spread in the jointing of the
the

the Leg, and folder the articulated Pieces, or at least render the Motion very harsh, forming a sort of rough Crust upon the Surface of the Cartilages, which ought naturally to be smooth, to the End that the Bones may slip one against another with Ease.

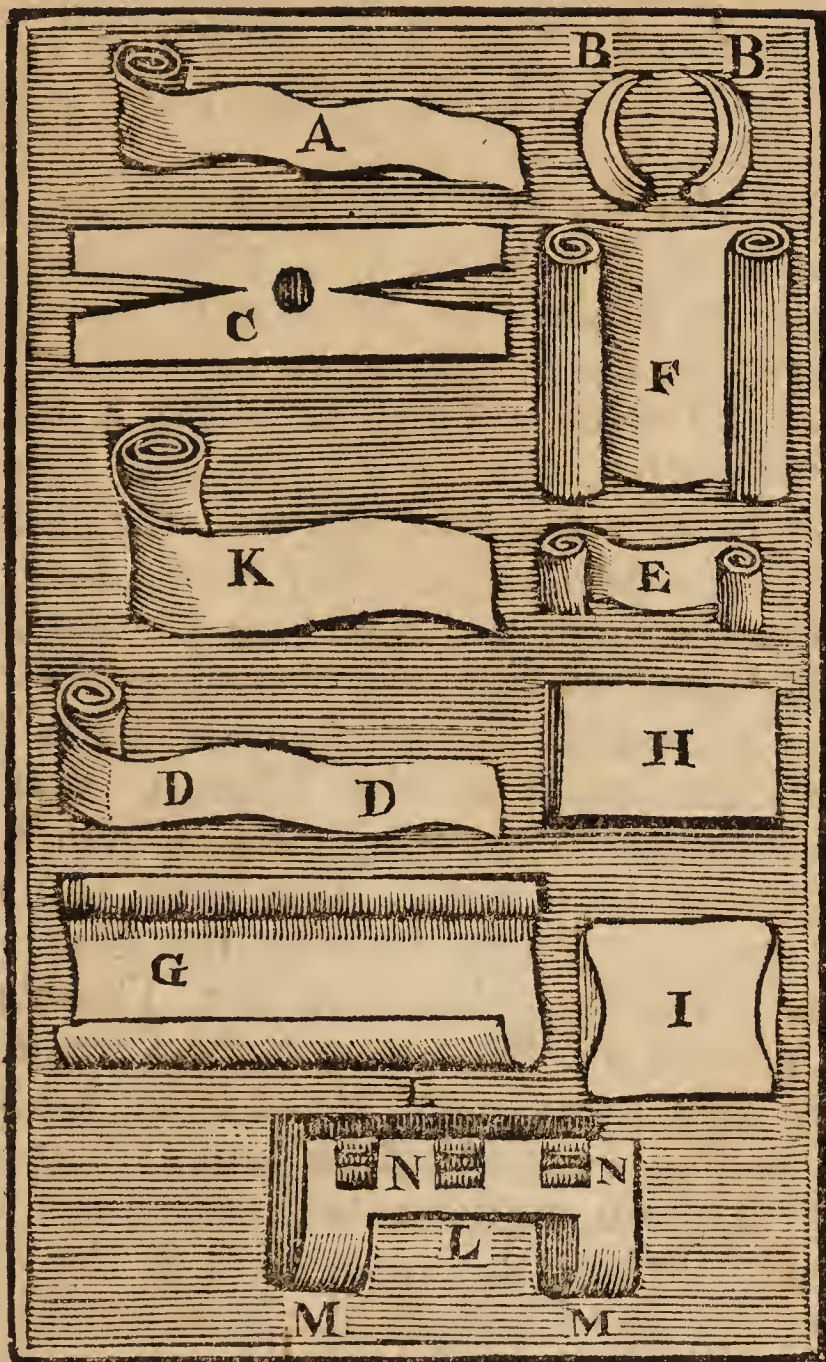
Those who have not the *Rotula* set, find a great Difficulty in walking ; because that, besides the Effusion of the nutritive Juice in the Joint, Anatomy teaches us that this Bone serves for the Adhesion of the *Aponeuroses*, and that in its natural State it is as a Pulley, and removes them from the *Fulcrum* of the Leaver of the Leg, of which Advantages the Patient is then deprived, and which are of great Use for walking strong and fast.

To reduce the *Rotula*, the Sole of the Foot must lean against something that is steady, the Leg being well stretched out, then making use successively of ones two Thumbs, one brings it down by little and little into its right Place. Great Care must be taken not to bend the Leg for any Cause whatever ; because that wou'd remove the Piece of Bone farther than it is ; this is so true, that it hardly mounts up at all, in such as immediately stretch out their Leg after the Fracture, and it gets up almost to the middle of the Thigh in those who fall wholly with their Leg bent, or in those whose Legs have been bent to find out the Fracture.

This Remark is so essential, that the Success of the Cure depends almost always upon it ; in effect, altho' the *Rotula* be broken there still remain some Parts of the *Aponeurosis* that retain it, which are destroy'd by bending the Leg.

When

When the *Rotula* is in its place, it must be kept there by a Bandage, that may be made differently ; some first make a little Bandage with the Roller (A) which forms a Figure of 8 with two Tails, and goes but two rounds ; after this they put on the Rolls of Linnen, or



Plaster (BB) upon and under the broken Bones, in the Figure of a Crescent ; they are cover'd with the Plaster, with four Ends (C) which some put under the Crescents, immediately upon the *Rotula*, but it is better

to lay it over them; then they make a Bandage with a larger Band, which forms a Figure of 8 like the first, and is made with the roll'd Band, with one Head (DD) or that with two Heads (E), and after 'tis put on they turn up the four Ends of the Plaister (C) over the Bandage, and fasten them with Pins, so as that they may exactly bring the two Pieces of the *Rotula* together, and prevent the Bandage from slipping.

After this the Part must be put into Junks, or into the Past-board (G) trimm'd with a Napkin, to hinder the bending of the Leg.

There are some who make use of the false Junks (F) with a Napkin folded 8 double, which they lay under the Ham, and unroll so as the two Rolls meet exactly at the small of the two *Condyles*. Then they take a Band like (E) six Ells long, and roll'd up in two equal Heads, between which they sow a Compress half Finger's breadth in thickness, which they put in the place of the Thumb, that has kept the upper Part of the *Rotula*, whilst you were taking your Band; then they apply the Band and Compresses holding the Heads one in each Hand, and having the Thumbs on that part of the Band where the Compress is sow'd, they carry each Hand from Right to Left, passing over the false Junks; but some bodies Thumb must be always upon the Compress, to support the upper Part of the *Rotula*. When the two Heads of the Band are brought to the Ham, one must cross them by changing Hands, to carry them like a Crescent under the lower Part of the *Rotula*, which is also cover'd with the Compress or Crescent (B): The two Heads must be shifted from one Hand to the other, and guided obliquely.

liquely under the Ham, as they come upwards, where they must cross each other to make them pass over the round, and the same must be continued to the end of the Band, bringing the Trusses near, by little and little, that the Pieces may be bound the closer. When this Band is ended, the Compress (H) four Fingers broad, and as long as the false Junks must be placed upon the fractured Part, and the Past-board (I) half a Foot broad under the Ham; the whole must be kept on by the Band (K) which at first makes two or three Casts round the lower Part, and afterwards two oblique turns that must cross each other upon the *Rotula*, then two casts round the upper Part, and may end where it will. The Part must be placed in Junks, and laid upon a Pillow, rais'd towards the Foot, to keep the Leg extended, and facilitate the motion of the Fluids: The same Precautions must be taken in dressing the Fracture. The *Callus* is 50 Days in forming, or at least before 'tis firm enough to allow of the Patient's walking.

I have since contrived a sort of Frame which serves me instead of the false Junks: It is made of *Turkey* Leather, lined with Shammy, and has four Notches or Holes, that serve to retain the turns of the Band, as may be seen in the Figure. (LL) make the two sides, and (MM) the Semicircles, whereof one goes round the upper, and the other round the lower Part of the Ham, (NN) are the Branches which retain the Casts of the Band by their unevenness.

Observation

Observation of Consequence.

On all Occasions wherein any Motions must be made, to replace the broken Bones, one must avoid those that are useless; Pain is not of so little moment as to be caused for nothing: An Observation that was communicated to me in publick will serve to prove what I say, and that I may alter nothing, I shall quote here the Letter just as it was given me by the Clerk of St. *Cosmus*, in the presence of the Audience, as I was reading my publick Lectures.

S I R,

“ **A** N Accident happen'd some Days ago
 “ to a Man who fell upon his Knee,
 “ and a Surgeon was sent for who cou'd not
 “ discover any Displacing: After this, by
 “ reason of the great Pain the Patient felt, a
 “ Master Surgeon, who was very skilful was
 “ call'd in, who cou'd no more find any Fra-
 “ cture nor Luxation than the first, therefore
 “ he order'd what was proper.

“ The Patient or the Assistants, not being
 “ satisfy'd with this, sent for a *Master Bone-*
 “ *Setter*, who immediately examin'd the Part,
 “ and perswaded the Patient and the Assistants
 “ that there was a Dislocation, which was not
 “ hard for him to do, by reason of the Pain the
 “ Patient was in. Hereupon he set himself about
 “ reducing this pretended Luxation, and be-
 “ gan to bend the Leg to the Buttocks with
 “ all his Strength, and to stretch it out, which
 “ caused such acute Pain that the Patient
 “ swooned away. Upon this he left off his
 “ Ope-

“ Operation to recover the Patient, which
 “ being done, the Workman began his Work
 “ again, and the Patient swooned a second
 “ time and Died upon the Spot. Wherefore,
 “ Sir, do us the favour if you please to tell
 “ how this cou’d happen.

Answer to the Letter.

FIRST, One may observe, that the Patient had been visited by two Persons, who separately were of Opinion that there was nothing displaced; but let us suppose for once that there was a Dislocation, I say, that this Bone-Setter ought not to have made these murdering Extensions, for it is certain that one ought not for any Case whatever to bend the Leg either at the Time or after the manner that this the Bone-Setter did.

The Time that the Patient felt such acute Pains was not proper to make the Extensions. If the Bone-Setter had read the Pages of the first Volume of this Treatise, where the Time and Manner of moving the Joints is spoken of, perhaps he wou’d not have committed this fault. In that Part of the first Volume, one may see how and which way the Limbs must be moved, and above all, ’tis observ’d there, that the Fore-Arm ought never to be bent so as to make it touch the fore part of the Arm, nor the Leg so as to bring it to the hind part of the Thigh, on any Account whatsoever. The Fracture of the *Tibia*, and that of the *Femur*, near the Articulation of the Knee, only require Extensions and Counter-Extensions in a right Line.

The Luxation of the Leg has no need of any other Motions; and whoever in Fractures
 of

of the Joints shou'd make a Motion of Flexion, wou'd rather displace the Bones than join them. 'Tis true, that in a Luxation one may make a little Flexion and Extension to replace the Bone, but this ought to be done gently, and as it were to try whether the Joint can make all these Motions.

If the Bone-Setter shou'd tell me that the *Rotula* was dislocated, he wou'd not justify his Management a jot better, because it is certain that only continues luxated because it is strongly forced against the *Condyles* of the *Femur*, by the excessive stretching of the *Extensors*; wherefore to replace it, this Extension must be lessen'd by stretching out the Leg as much as possible, then one brings the Insertion of the *Extensors* near their Origin, which relaxes them a little, and renders the reduction of the Bone easy.

If the Bone-Setter says there was a Fracture, 'tis still worse, because it has been demonstrated in the Chapter of the Fracture of the *Rotula* that the Flexion of the Leg is hurtful: The Structure of the Part is sufficient to prove it. Nevertheless he must have an excuse, and won't fail to say that the starting of a Nerve was the Ail that caus'd him to make these extraordinary Motions. I will ask what he means by a Nerve started: If he means that sort of convulsive Motion that is known thro' the World under the name of *starting*, all the World will see that he was in the wrong to make these Motions, they are not proper, and wou'd be more apt to make it start than to cure it. Does he understand by the starting of a Nerve the displacing of the Tendons? Let us forgive him this Expression in favour of his Ignorance;
but

but let us not confirm People in this Error, for the Tendons cannot be displaced without breaking (as will be seen in the Chapter that treats of this Subject) or unless there be a Luxation or Fracture, besides this does not happen after the manner that he may understand it, but as it has been explain'd in the general and particular Treatises of these Diseases.

Wou'd he say that the Tendons may come out of their Sheaths? The Structure alone proves that it cannot be; and shou'd one grant a possibility of it, nothing wou'd be more contrary to replace them than the violent Motions we have so much blam'd: And if one wou'd grant what is not fact, that one shou'd bend and stretch out the Joints with Violence, to replace the Tendons when out of their Sheaths, this wou'd only be for those Joints where the Tendons have Sheaths, it cou'd not be for the Knee, where 'tis known that the Tendons which move it have no Sheath.

I conclude that the Pain proceeding from the useless Extensions, may have been the Cause of the Patient's Death.

C H A P. XIII.

Of the Simple Fracture of the Leg.

IF there is any thing wanting in this Chapter, you may have recourse to the general Cure of Fractures, whereon I have enlarged

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very

very much; nevertheless I hope that you will find in this enough to satisfy you.

Structure. The Leg is compos'd of two Bones, the most considerable is the *Tibia*, which forms the whole Articulation with the Thigh, and most part of that of the Foot. The least considerable is the *Perona*, which contributes not at all to the forming of the Articulation of the Knee, and only makes the external limit of that of the Foot, which is call'd the Ankle, or the *Malleolus Externus*.

The Kinds. These two Bones may be broken both together or separately; sometimes the one is broken above and the other below, seldom both in the same place, except when the same Cause acts at the same Time upon both, upon both, as the Wheel of a Waggon, Coach, &c.

When the Leg is broken by a blow that only strikes the *Tibia*, this Bone only is broken at the Place that is struck, and the *Perona* sometimes is fractured by the fall of the Patient, because this Bone is not able alone to support the weight of the Body; in such Case the fracture of the *Perona* is generally distant from the Place where the *Tibia* is broken: We see that in falls the *Tibia* and the *Perona* generally break, one in one Part and the other in another.

Sometimes there are Shivers or Splinters separated from the body of the Bone, but still adherent to the Flesh.

'Tis even seen that the same Bone breaks in two or three Places, and its Fractures sometimes happen near the Joint, or even in it, as the *Malleoli* have been known to be broken.

The fractured Ends have different Figures, and suffer various displacings.

Signs. The Signs are discoverable by the Sight, the Hearing, and the Touch: It may be seen if

if the Leg has lost its straitness, and its shape; the Crepitation may be heard when one moves the Part, and the Bones grate against each other; and the unevenness may be felt with ones Fingers by running them along the inner Surface of the *Tibia*, or along its Crest.

The Fracture of the *Tibia* only is easily discovered, because the internal Surface of this Bone is not covered with Muscles; but the Fracture of the *Perona* is hard to be found out when the *Tibia* is not broken. Signs of the Fracture of the Tibia.

To be assured whether the *Perona* be broken, one must grasp with one Hand that Part of the Leg which is below the *Gemelli*, and with the other the Sole of the Foot near the Heel, and then turn the Foot alternately out and in, to thrust the *Astragalus* against the *Malleolus Externus*, and move the *Perona*. If 'tis whole the Hand that holds the Leg will be sensible of it by its Resistance; and if the Bone is broken, it will be perceived by the Crepitation.

When one is certain of the Fracture, and has a just Idea of the Place where the Bone is broken, and as near as possible of the Figure of the broken Pieces, the Part must be shaved if 'tis Hairy, and the Reduction made.

Suppose both the Bones of the Leg were fractured four Fingers breadth above the Ankles; the Patient being laid in his Bed, with the broken Leg as near as possible to the Side, to facilitate the Operation, an Assistant must put the four Fingers of both Hands very gently, the one within, and the other without, below the Articulation of the Knee, where the Calf of the Leg is not quite at the largest: His Fingers must be lock'd in one another to strengthen his hold, and the two Thumbs must Example.

Manual
Operati-
on.

be extended before, to take hold of the Leg below the Prominence of the *Tibia*. Another Assistant, stronger than the first, being placed at the End of the Bed, must put the Fingers of both Hands under the Leg above the Heel, locking them one in another like him who holds the upper Part, and even more, because the Part which he holds is not so large: He must bring his Thumbs forwards, so as to make them touch in a Parallel Line, to grasp the two Bones of the Leg circularly; then the Surgeon being on the outside of the Leg, with his Back to the Foot of the Bed, must take hold gently of the fractured Place with both Hands, the Fingers under, and his Thumbs above; he must order the two Assistants to draw each on their Part raising the Leg gently, whilst he at the same instant lifts up the fractur'd Part softly with his Hands, without making as yet any use of his Thumbs.

When the Leg is rais'd enough to facilitate the Operation, he must order the Assistants to draw strongly in a right Line, then he must work, with the fleshy Part of his Thumbs, placed one lower than the other, upon the fractured Part to replace the Bones.

This Operation which the Ancients call *Coaptation* or *Conformation*, is not always perform'd the same Way.

What has been just mention'd suffices sometimes, but the Surgeon is often obliged, that he may Compress the Part with more strength, and more exactly, to place the fleshy Parts of his Thumbs over against each other, to make an effort on the very Place that is fractured; sometimes the Thumbs do the business, and when all these means don't avail, one is obliged to make an Incision to lay the Bone open,

pen, and use the Elevatories, or the Trepan. I have hitherto avoided this Operation, (which is sometimes more fatal in its consequences, than cruel in its self) by using of Straps, instead of Hands, to make the Extensions strong enough; for the Difficulty of making the Reduction proceeds only from some Part of the Bone's, continuing to touch by its sides, and this Obstacle to the replacing them subsists no longer when the Extensions are sufficient: It may also depend upon the turn of a Hand Remark. to be made by him who holds the lower Part, sometimes to the Right, sometimes to the Left, at other times upwards or downwards, and always at the time that he is bid; he must not act without orders, and even ought to be well instructed, that he may execute them right; for this Reason one must not only place the Assistant that is strongest at the Foot, but also him that has most Experience.

As these Operations are sometimes long, one must at the beginning place the Assistants commodiously, that they may be able to keep in the same situation all the Time of the Reduction, and putting on of the Dressings.

This is the Time when the Assistant that held the lower Part of the Leg, above the *Malleoli*, must shift his Hands gently: If 'tis the right Leg, he must slip the Palm of the Left Hand under the Patient's Heel, his Thumb being at the bottom of the *Malleolus Externus*, and the four Fingers at the bottom of the *Malleolus Internus*; he must shift his right Hand with the same easiness by sliding it away, and without letting go his Hold, Remark. he must replace it so, as that the Palm of his Hand may be at the inner part of the Foot, his Thumb at the Sole, and his four Essential Operation.

Fingers may grasp the *Tarsus*, as near as possible to its jointing with the Leg. This changing of Hands must be done speedily, exactly, and gently; preserving the Leg in the same Posture, and drawing always with one Hand, whilst the other is removed, and then with both, when the second is placed. During this the Surgeon always supports the fractur'd Part that it may not be disorder'd.

Things being thus, the Surgeon must have his Dressings brought near him, which he must set in order himself, that without being at any trouble, he may find all the Pieces in the place he has laid them, which is as they are to be put on.

Dressing.

Applica-
tion of the
Simple
Compress.

He must take Simple Compress (A) steep'd in Aromatick Brandy, holding it by the two Corners that are not cut with the Ends of his Thumbs and his Fore-Fingers, the latter being placed underneath and the former at the Top: He must carry the Compress on the inside of the Leg, and letting fall his Hands with the Ends of the Compress on the outside of the Leg, he must take hold of the Ends that are cut with the Middle-Finger, and other Fingers of each Hand, and must draw them outwards from the inside over that end of the Compress that is not cut, which end must be made fast underneath, by little and little, letting go the Thumbs by degrees, till the two ends of the Compress that are cut have entirely cover'd the other, and go over it to finish their Circumvolution. One must avoid Folds and Ruslings which would cause Pain.

This Compress being put on exactly, one must take the first Band (B) three Ells and a half

half long, more or less according to the size of the Leg; it must be at most but three small Fingers broad, and must be unroll'd eight or ten Fingers breadth, the small end must be dipt in Aromatick Brandy, that it may stick and not slip.

To hold the Band well, and put it on with Application of the more ease, one must keep the Roll in the Palm of the right Hand, if 'tis the right Leg, first Bandage. the Thumb being placed on that side of the Band that unrolls, and the four Fingers on the opposite Side; the End that is unroll'd is held between that Part of the End of the middle Finger that is opposite to the Nail, and the Nails of the Fore and Ring-Finger, or else 'tis held by the Thumb and the Fore-Finger, the first way is the most convenient.

The Band being held thus, the Surgeon must turn the back of that Hand that has the Roll towards the Leg, and bringing the Band and his two Hands within an Inch of the Leg, he must put the End of it held by his left Hand under the Leg, beyond the inside of the Tendon of *Achilles*, near the Internal Surface of the *Tibia*, over against the Fracture, where the End of the Band will be easily fasten'd, because 'tis wet, and rests upon the Compress. The unroll'd Part of the Band must be carry'd thither with the right Hand, and when it has been unroll'd and carry'd down perpendicularly the length of six Fingers, the left Hand must take the roll at this Place, and the four Fingers of the right Hand replace themselves lightly within the inner Part of the Leg upon the Fracture, to follow the Band underneath, where they must remain to support the fractured Pieces, whilst the left Hand finishes the first circular cast

of the Band, and unrolls it by carrying the Roll perpendicularly upwards, where the Band must be unroll'd five or six Fingers breadth, and where the right Hand must take it again, without moving it till the left Hand has taken its Place under the Leg to support the Fracture, till the right Hand has finish'd the second Cast of the Band, which it does by carrying what is unroll'd of this Band over the first Cast; then continuing this Method, they make a third Cast, and begin the first Truss going upwards. This first Truss ought not to be above two Lines distant from the third Cast; the second Truss two Lines and a half, the third three Lines, and the others but four Lines, or four and a half at the most. They continue always the same Method alternately; one of the Hands supports the Part, whilst the other makes use of and carries round the Band.

Remark.

It must be observ'd that the Leg being smaller at the Place where we have suppos'd the Fracture, the turns of the Band can't be made going upwards towards the Calf of the Leg, but there will be a Pucker, that is to say, an empty space at the Place which the Band don't bear upon.

To avoid this Inconvenience several Methods are propos'd, some wou'd fill up, and equalize the Leg with Compresses from the Heel to the Calf, before the putting on of the first Band; others don't trouble themselves about Folds or empty spaces; and others again make Reverses. I will propose a fourth way to take up the Band, wherein I have had very good Success.

As for Compresses, I wou'd not advise the putting them on before the first Band, because
the

the Circumvolutions must be as near the Fracture as possible, to retain the Bones the better in their Places.

They who let the Roller be rumbled fall into two Inconveniences, first they only compress the Part by the upper Edge, as a Cord or narrow Ribband wou'd do, which is not proper, and secondly the lower Edge of the Band which has no support, is loose, makes a Pucker, and folds at the will of the Casts of the Band that pass over it: These two inconveniencies render the Band useless; because it don't contain the Part, and hurtful; by reason it plaits and rumples so as to hurt the Patient.

The Reverses therefore are much more convenient. In making them several things must be observ'd, 1^o, to begin them where the Part growing larger won't allow the Roller to lye even; that is to say, when one perceives that if one continues to roll the Band it will make Puckers, or Rampants instead of Trusses.

The second thing to be observ'd is not to unfold so much of the Roller.

The third is to hinder the Truss, that is just made, from loosening, which is done by leaning the four Fingers of the left Hand upon the last part of the Band that is underneath, and bringing the Thumb forwards to direct it.

The fourth is to reverse the Head of the Band, the upper side under, the Part that is roll'd hindmost, and the Part unroll'd foremost, to fold the Band above, so as that the upper edge of the Roller may be undermost, and that which was on the inside may be on the outside.

The fifth is not to draw the Head of the Band till the fold or or Reverse be ended.

The

The fixth is to observe, in drawing the Band softly downwards, to unroll as much as necessary to finish the turn, and to hold the right Hand in this Place till the left has taken the Roll of the Band, as has been said above.

7°. The right Hand, on parting with the Roll, must pass lightly, from the inside to the Part underneath over the Reverse just made to smooth it and make it equal, following the Roll which is carry'd by the left Hand from below upwards, and drawing the Band lightly at the very instant that it is unroll'd to make the second Reverse.

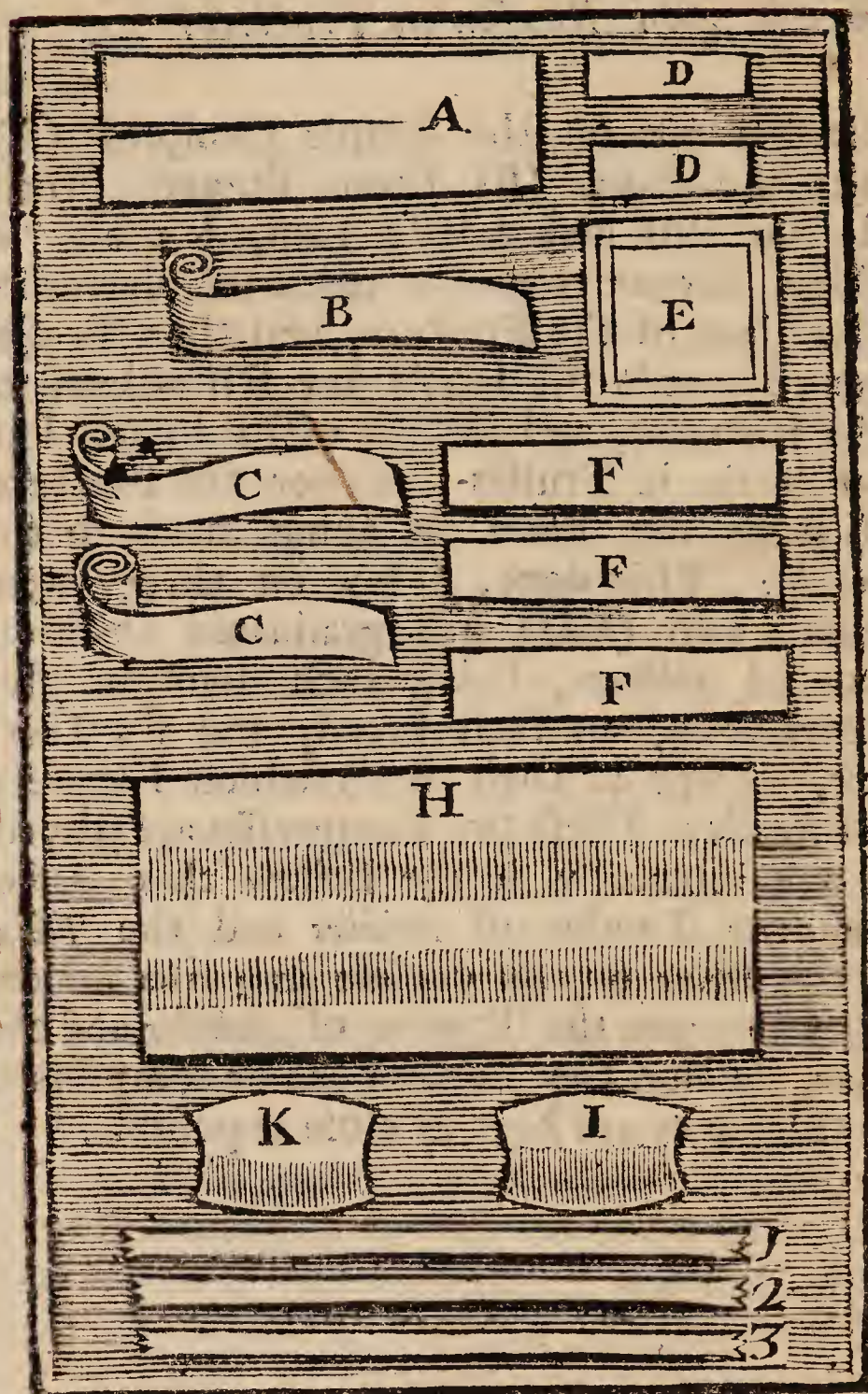
This first Reverse being finish'd they make a second, then a third, a fourth, or more if requisite, and all going upwards toward the Knee, observing two things, first to raise the Band at every Reverse and Truss, at the time that the left Hand carries it under, that is to say, that one cast of the Band must not be made upon another, because the Bandage must terminate going upwards, and every turn must be higher than that which went before it; and for this they take the time that the Band goes under the Leg, and trims the External Part; which they regulate by the distance they put between each Reverse. If this Circumstance be not observed the Band that comes to the outside of the Leg would be lower than the Reverse just made. The second thing to be observ'd is to place the Plaits of the Reverse so as that they may meet in the same Line going upwards, which gives them exactly the shape of an Ear of Corn. When there is no longer need of the Reverses, they make circular Casts going always upwards to finish the Bandage near the Knee.

This

This is a Method wherein I have had good Success, and which is founded as much upon Reason as Practice.

Having put on the Simple Compress (A), I take the Band (B) three Fingers broad, and two Ells and a half long, I use it in making Circumvolutions one over the other at the Place of the Fracture, and then Trusses going upwards till I find my self obliged to make Reverses, and instead of so doing, I go down again in Trusses pass over the Fracture, and finish my Band by going down to the *Malleoli*: This done, I lay on three Compresses, two (DD) are graduated at their ends and fellows, being each four or five Fingers long, an Inch broad, and six Lines thick, except at their Ends which I leave a little smaller. These two Compresses are placed, the one internally in the hollow that is between the Tendon of *Achilles* and the *Tibia*, and the other on the outside in a like hollow that is between the Tendon of *Achilles* and the *Perona*, so that the Tendon is not compress'd, and the Bones are kept as close as possible.

The



The third Compress (E) is a little more than five Fingers square; it is six Lines thick, except half a Fingers breadth on every side where it is graduated, and not so thick by half. I lay this third Compress from the small of the Heel to the Small of the Calf, so that its middle encompasses the former two little Compresses, which I call'd twins. This done, I take the second Band (C) to make fast the whole, beginning near the Heel, then going up to the Fracture, over which I make three rounds, before I go higher to finish my Band. After this I lay on the longitudinal Bolsters (FFF), then the third Band which fastens them on, and after that the Past-boards, Junks, and the rest that are going to be describ'd.

In the following Method of Reverses, one ought after the first Band (B) to put on the second (C), which must make three turns upon the fractur'd Part, then go down in Trusses to the *Malleolus Externus*, which it must cover, passing obliquely over the Instep, to cross the Sole of the Foot, and coming back obliquely upwards, to make a St. *Andrew's* Cross with the first oblique turn, then covering the *Malleolus internus*, returning back to the Leg, going upwards in Trusses passing over the Fracture, and thence to the Calf of the Leg, where it forms Reverses if need be to end in Trusses, near the Knee like the first Band.

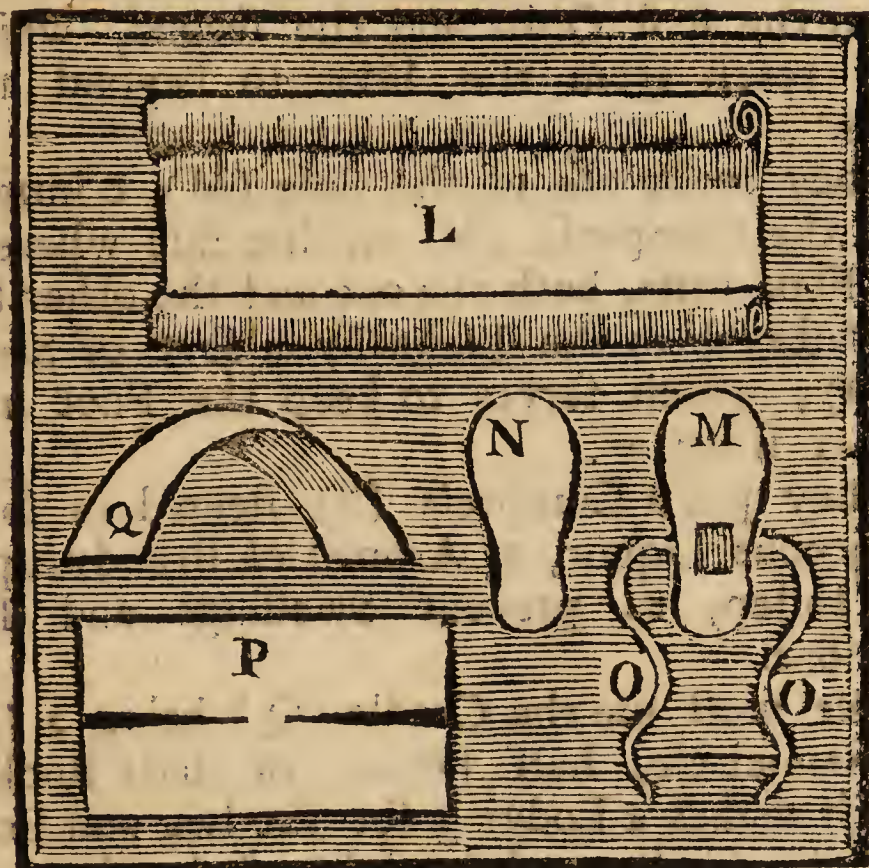
When this second Roller is put on, they place the graduated Compresses (H) which are thicker from the Heel to the Calf than they are beyond it. I content my self with having propos'd the Method that seems to me the best, without pretending to show the Defect of graduated Compresses; practising will determine

determine you of your self to choose the best. I shall conclude by adding that they fasten on this graduated Compress with Pins, and afterwards put on three longitudinal Bolsters 12 or 13 Inches long, an Inch and half broad for great subjects, and less in proportion for small ones; and as to their thickness 'tis different. That which is laid from the Small of the Heel to within two or three Fingers breadth of the Ham, is very thick below, and slender at the Top; another which is laid along the inside of the *Tibia*, is two Lines thick all along; the third, which is laid on the outside, is a little thicker than at the Top. These three Compresses being thus put on, are held above and below by the two Assistants, and then made fast with the third Roller (C), which is longer than the others. They begin to apply it below, at the edge of the three longitudinal Bolsters, over which they make three Casts to fix the end of the Band, then they go upwards in Trusses, which form Circles to the upper End of the longitudinal Bolsters.

Then they clap on the Past-boards (IK) which are an Inch shorter then the Bolsters, and sufficiently large to encompass the whole Leg within a Finger's breadth both before and behind; they are cut a little sloping at the bottom and top, and are put one on the inside, and the other outwards; they are fasten'd with three Ribbands, 1, 2, 3; which go twice round, and are ty'd on the outside of the Leg, in a Knot and a Rose: They begin by tying the middle Strap, and then the other two.

The Leg being thus made ready, they place it in the Junks (L), which are made with a handful of long Straw, and bound in the

the shape of a Fagot, or twisted about with Fillets or Packthread: They cut them of a proper length, to take up from the bottom of the Foot to above the Knee, and they wrap them in a Napkin which they roll over the two Ends.



These Junks must be long enough to encompass the Joints above and below the fractured Bone: The sides of the Leg must be trimm'd in the hollow places, and those whereon the Junks must rest, with little Compresses or small Cushions. The Junks must be bound on with Straps, wherein what we mention'd in tying on the Past-boards must be observ'd. The fore-part of the Leg, over which the Straps of the Junks go, must be trimm'd with a thick Compress to secure the Tegument that covers the Crest of the *Tibia*.

The Leg being in the Junks, the Pillow whereon 'tis placed must be even, and soft, and laid upon a Quilt, which must it self be very even; and to preserve both the one and the other in this evenness and steadiness, the Bed must only be of Quilts without a Feather-Bed, and there must be a Plank laid between the first Quilt and the second, which must reach from the Foot to beyond the Hips.

They make use of the Sole (M), trimmed with the Compress (N) on that side whereon the Foot rests, both the one and the other being fasten'd to the Junks by a sort of Strap (O O); which serves to keep the Foot in a proper situation.

They put a Compress (P) steep'd in some Spirituous Liquor, as Aromatick Brandy upon the Instep, to prevent Swellings and De-fluctions.

One must use the Cradle (Q) being a sort of Semicircle, half Drum, or half Bucket, which makes a Lodging for the Leg and Foot, to defend it from the weight of the Sheet and Bedcloaths, and under which there is room enough to supply the Leg and Foot with Napkins, and other hot Cloths, which they warm from time to time when the Foot is cold.

As to its position, the Leg must be raised towards the Foot, because this Posture favours the return of the Blood and the *Lympha*. It must lye soft to prevent Pain, and steady, because Motion would displace the Bones, and prevent the formation of the *Callus*.

The Patient must lye in a right Line upon his Back, with his Head moderately rais'd for his Convenience, but not too much, for
fear

fear the Weight of the Body should draw him down to the Foot of the Bed.

They have a board cut as broad as the Foot of the Bed, which they fasten to the Bed-posts, with Pegs or Nails the same way as the Head-board.

Against this Board they fasten a Billet four or five Inches thick, and trim it with Napkins, which makes it yet larger for the convenience of the Patient, who makes use of it from Time to Time, to raise his whole Body towards the Bed's Head, or only to resist the Tendency which the Body has to slide towards the Feet of the Bed. He must not make use of this Billet till such time as all Accidents are over.

There must also be a Cord hanging at the Tester of the Bed, or at the Cieling if the Tester is not firm enough, which helps the Patient to move himself for his necessary Occasions.

Being thus placed, they Bleed him some time after, or even upon the spot, in case of Necessity, they repeat the bleeding, make him observe a Regimen, keep him very warm in Winter, and alleviate the excessive heats of the Summer; see the general Cure of Fractures.

C H A P. XIV.

Of the Complicated Fracture of the Leg.

AFTER what I have said of Complicated Fractures in my Account of Fractures, in general, or in that of the Thigh in particular, I might be excused from speaking of the Leg; but one can't treat too amply of a subject so useful, all the Cases whereof can never be foreseen. However, I hope that either in this Chapter or the others there will be enough to prevent any one's being a Novice in the Cure of the Complicated Fractures that may befall the other Parts of the Body.

'Tis known that three Things render a Fracture Complicated, *viz.* the Diseases, the Causes, and the Symptoms.

The Diseases are Dislocations, Imposthumes, Ulcers, and Wounds. We have treated sufficiently of Luxations with Fracture, in the general Account of Luxations, and of Fractures with Wounds, in that of the Thigh, therefore I go on to Fractures with Ulcers; and to the end that what I say may make greater impression on the Reader, I will cite two Cases upon this Head that are very different.

In the one, the Bones were laid open with a *Caries* and Fracture, and in the other there was a Fracture without any other alteration in the Bone, but there was an Ulcer at the same

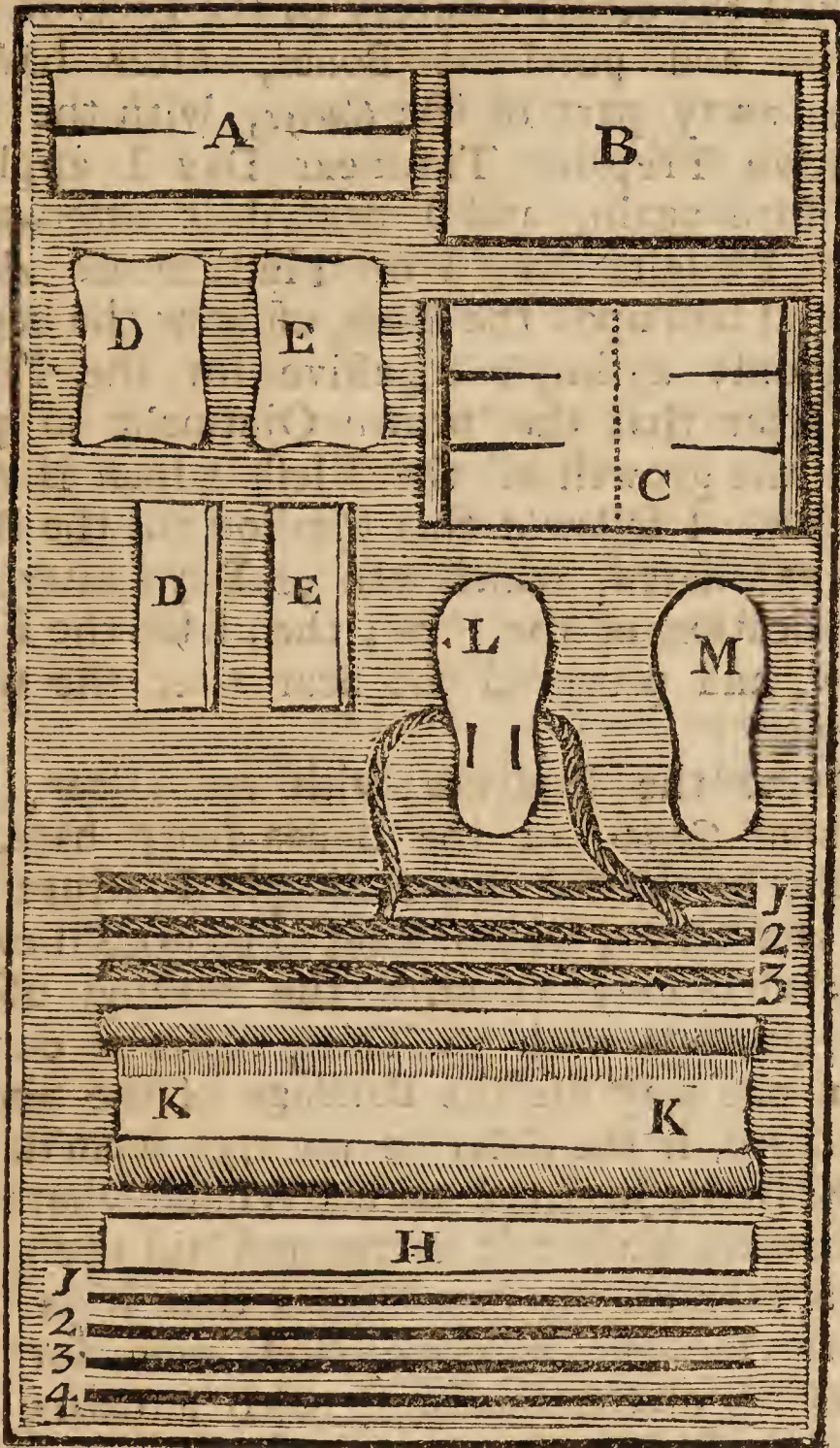
same place where the Fracture was, without the Bones being bare.

The first was a Youth between 18 and 20 Years Old, who had an Ulcer with a *Caries* in the middle of the *Tibia*, which had been neglected for several Years. It happen'd by chance that a Cart-Wheel ran over his Leg, and fractured that Part where the *Caries* was. The Wheel had no great difficulty to uncover the Bone, which was only cover'd with proud and Spongyous Flesh: The *Perona* was whole, and perhaps the *Tibia* had not been broken but for the *Caries*, which had affected almost half its thickness. In this condition he was brought into the Hospital at *Courtray*, where I was then first Assistant. Having discovered the Disease to be as I have describ'd it, I placed the fractured Part upon a little Quilt of the length of the Leg, during the Time that I prepared my Dressings. I placed upon the Junks (KK) all the Pieces necessary, according to the order in which they were to be apply'd; after which I dress'd the Wound.

I cut all the unsound flesh into loose Pieces, and even those which still adhered to the putrify'd Bones. There was no need of any Extension, because the *Perona* was entire, which had prevented the Bones getting one upon t'other; the lower Part only went beyond the other two Lines, I re-united it by thrusting it with the Thumb of one Hand, and raising the Foot with the other; I dress'd all the Wound with dry Lint, and having wiped away the Blood that was about it, I put under the Leg the Junks, whereon all my Dressing was, which consisted of the Simple Compress (A) cut at both Ends, with which I cover'd the Wound, turning back the four

Ends of the Compress one after another; after this I cover'd it with a thicker Compress (B) which serves usually to prevent the rest of the Bandages being spoil'd, because it soaks up the Matter that flows from the Wounds or Ulcers. After this I put on the Bandage with 18 Tails (C) beginning at the Middle, then at the Bottom and Top, fastening always the Ends of the Band with those that follow'd. When I had placed six Tails on each Side, I put two Compresses (DE) all along the Leg, one within and the other on the outside, to serve as Splints, which were made fast by the six last Tails of the Bandage. Over all this I bound with the Straps, 1, 2, 3; the two Pastboards (DE) which encompass'd the Leg: I placed the thick Compress (H) four Fingers broad, and as long as the Junks, upon the fore-part of the Thigh, the Leg, and the Foot; this Compress serves to prevent the Straps of the Junks from hurting; and afterwards I ty'd the Junks with four Straps 1, 2, 3, 4; at equal distances from the *Malleoli* to four Fingers above the Knee, taking Care, above all, not to let the Straps pass over the Place where the Wound or Ulcer was, because it wou'd be very detrimental. The Foot must be supported by the Sole (L) trimm'd with the Compress (M) steep'd as usual. One must make use of false Junks as has been propos'd in the Complicated Fracture of the Thigh; or if, instead of all these Junks both true and false, one chooses a Case, I have contriv'd a new one, the Use and Description whereof you will find at the end of this Chapter.

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I dress'd this Fracture thus for several Days, without taking any Care of the Radical Cure of the *Caries*, because the Patient had the Fever; but as soon as this Accident ceas'd, I apply'd the actual Caustery to the Ends of the broken and putrify'd Bones, after having taken away part of the *Caries*, with the Exfoliative Trepan. The next Day I apply'd the Fire again, and I dress'd it afterwards with Pledgits steep'd in Tincture of *Aloes*, which I laid upon the Bone, using at the beginning only a simple digestive for the Flesh, and after that the brown Ointment to prevent the growth of the Flesh which is very hurtful. I follow'd this Method till the Bone was exfoliated, which was 50 Days after the Application of the Fire; then I let the Flesh grow, and procured the Scar after the usual manner.

As to the Fracture with an Ulcer, but without *Caries*, or the Bones being bare, it might be dress'd like a Simple Fracture but for the Ulcer, which being to be dress'd every Day absolutely requires the making use of the Bandage with 18 Tails, till it be cured; then one may use the Bandage of the Simple Fracture, if the *Callus* be not yet form'd.

As to the Fracture with a Wound where the Bones are broken in pieces and laid open, one must take all the Precautions that have been given for the Bandage, and even for the Dressing of the Fracture, with a *Caries*, excepting the Application of Fire, which at the most can only be proper at the End, I mean when the Exfoliation is slow and difficult, and even then it must be done with Circumspection.

If any Pieces of the Bone are found to be entirely separated, they must be drawn out, and in their room must be placed such as still adhere to the Flesh, because they may close again, if not, they fall off with the Suppuration; nevertheless if these Splinters, or even the Ends of the Bones shou'd be so sharp, as that they may hurt the Vessels, the Muscles or the Tendons, they must be cut off with a Chisel, Incisive Pinchers, or other Instruments which the Surgeon shall think proper.

If there should be a *Hæmorrhage*, the Blood must be stanch'd by the Ligature, the Button, other Stypticks, or Compression.

By the Ligature, if the Surgeon sees the Vessel, and can run the crooked Needle threaded thro' easily, without hurting any Nerve or Tendon.

By the Button, when the Vessel is very large, and a way can't be found to make use of the Ligature.

By the other Stypticks if the Vessel is small.

By Compression when it is not possible to make a Ligature, and the Application of the Button or other Stypticks shall be judged pernicious to the neighbouring Parts, whereon the Vitriol might make some ill impressions.

If there be any Extraneous Body, as Stones, Balls, Pieces of Boot, of Stockings, &c. they must be drawn out observing all the rules of the Operation of the *Exarexis*; then one must bring the Shreds of the Wound near each other, if there are any, and afterwards bind the Part, and give it a right situation as has been already said.

A Fracture with a Wound made by a cutting Instrument is to be differently managed; one must immediately bring the Lips of the

Wound together by an uniting Bandage, if it be long; and if it be very oblique or transverse, one must make the Suture; they use the Bandage with 18 Tails, till the entire Reunion of the Wound.

This Method succeeds, provided the subject be good, and observes an exact Regimen, at least I have seen it have success in an Arm almost cut off by the stroke of a Sabre, and even in the Jaw, where there was a Wound with the Flesh dilacerated.

I have seen in Fractures with Wounds in the Arm, the Fore-Arm, the Jaw, and the Leg, a sort of Cuirass us'd with good success, being moulded to the Part, and trimm'd with a Compress, and having a little Wicket join'd by a Hinge or two, made in it, which shuts with a Hook, and opens at the place where Wound is, that it may be dress'd: Tho' I have seen it us'd for the Leg, and the Fore-Arm, it has not had the same success; it suits much better with the Arm, and Jaw, because one may place the Fore-Arm and the Leg conveniently upon Pillows, and fix them so that one may dress them conveniently without displacing the Bones, whereas it is not the same with the Jaw, and the Arm, where it is pretty Difficult to keep the Bones in the Condition wherein they are placed. *Sculdetus* furnishes us with something like it in his Magazine of Surgery, to which I refer you.

A Description of a Case of a New Invention, for the Dressing of Complicated Fractures of the Leg.

TH E R E are three Things absolutely necessary for the perfect re-uniting of broken Bones.

1°. The Bones must be so join'd and brought together, that they may touch exactly throughout their whole Surface.

2°. Both ends ought reciprocally to sweat out or distill a nutritive Juice which has all the Qualities requisite to agglutinate, join, and folder the Bones together.

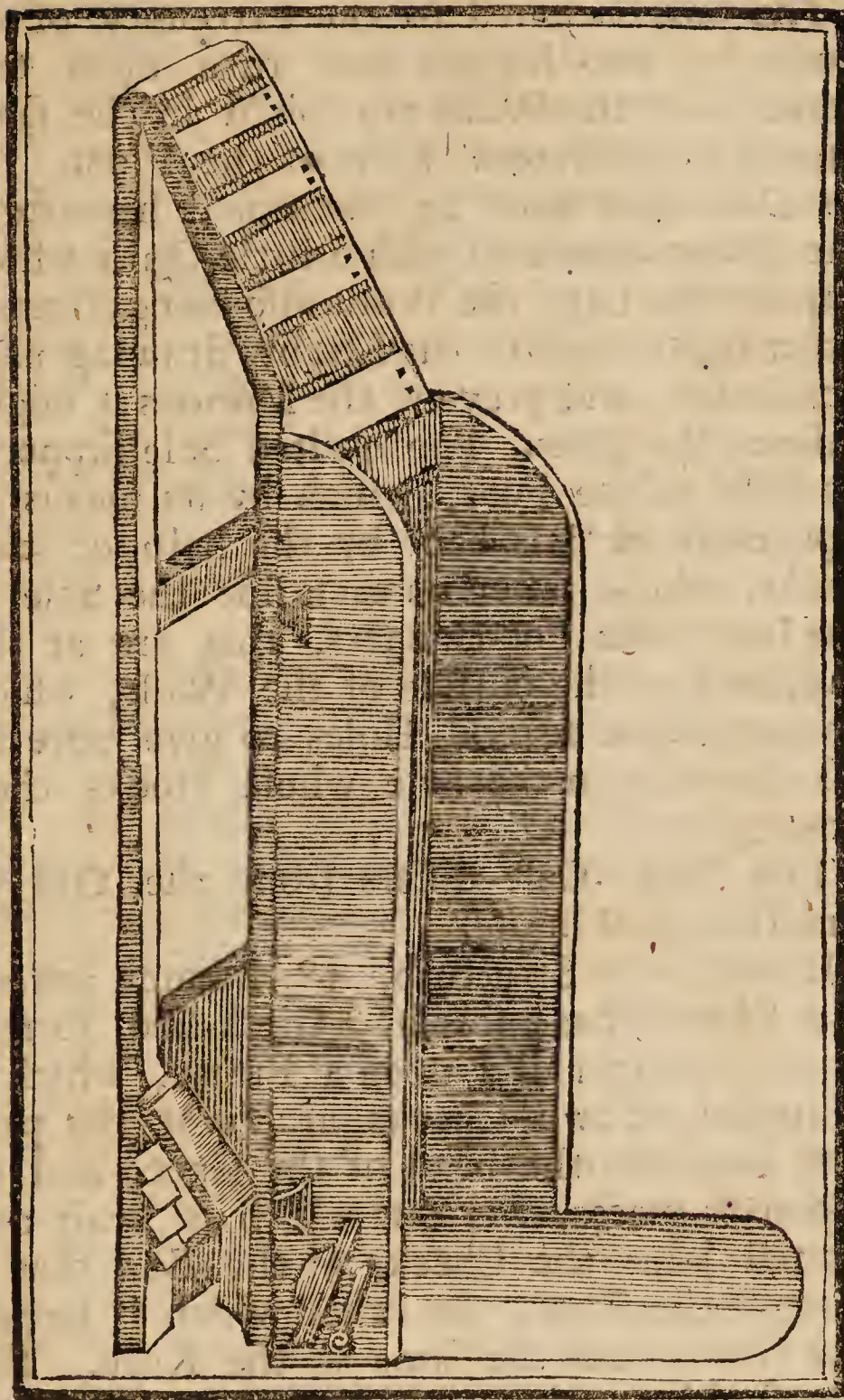
3°. During the 30 or 40 Days, more or less, that the Re-union of the Bones is perfecting, they must be kept still, to the end that the Cement which is made by the Nutritive Juice, may not be interrupted in its Agglutination, by Motions that would destroy in one Minute the Work of several Days. To compass this last End, the Fractures must be dress'd as seldom as possible, the Bandage must be neither too tight, nor too loose; the Patient's Body must be placed commodiously, the wounded Part a little rais'd, to facilitate the return of the Fluids: It must also lie soft, that all may induce the Part and the Patient to observe that Rest which is so necessary for his Cure.

This Machine which I have presented to the Academy, is of great use in procuring all these Advantages, but before I describe it, I believe it will be better to give an Account of those that have been us'd till now, that the advantages

advantages of this may be the better perceiv'd.

I shall take no notice of the Cases or Junks that are proper for Simple Fractures, because it is easier to contain them; 'tis not the same with Complicated ones, for which they have made use of the Bark of Trees, Junks, false Junks, and a Case; success has made them prefer this last Method to the others, therefore I shall only speak of the Case, the rather because the Machine that I offer is it self a Case in perfection.

The



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The Common Case is compos'd of four Pieces, *viz.* a Sole, a Floor, and two Walls.

The Sole is join'd to the extremity of the Floor by two Hinges that turn upon two Hooks, and the Walls are join'd in the same manner to the lateral Parts of the Floor, for the Uses that shall be mention'd hereafter: The Floor is cover'd with a little Quilt which supports the Leg; the Walls also being trimm'd with a Quilt contain the Leg by drawing near each other, and prevent the Motions it might make on the Sides. The quilted Sole supports the Sole of the Foot, which by its means is kept more or less bent by the help of two Hooks, which fasten on each side the Sole in two Irons like Pot-Hangers, that are at the End, and on the outside of the Walls, which Hangers have several Holes to give more or less elevation to the Sole whose Hooks they receive.

The New Case differs from the Old in Structure, and in use.

It differs in Structure, 1^o. Because instead of a Floor it has a sort of a Girth-Bed, form'd by a Ticking nail'd upon a Frame, which is compos'd of two Cheeks arch'd at the part that comes to the bend of the Knee, and of two cross-pieces, the one which is strait and shortest joins the Cheeks at the End that is towards the Foot; the other which is longest and arch'd does the same at the Knee. The second thing, wherein this Case differs from the first, is a frame compos'd also of two Cheeks and two Cross-pieces, the whole parallel to the upper Frame, excepting that the Cheeks of this latter are quite strait, and those of the upper one are arch'd. The Cheeks both of the one and the other Frame are

are join'd together, at the end that is towards the Thigh by two Hinges, which gives liberty to separate or bring them near more or less; and to keep them at a proper Distance. There is a sort of Pallet jointed by two Wooden Hinges, that hang upon two Hooks fasten'd to the ends of the Cheeks of the upper Frame; which Pallet falls against the Cheeks, and may be rais'd by degrees that are mark'd by Notches cut for that purpose, in the upper part of the Cheeks of the under Frame, towards the Foot, so that one may raise or let down, the upper Frame whereon the Leg lies, more or less, for the Uses we are going to mention.

This Case differs from the other, in that with the same advantages, it has an infinite number of others more essential, without any of its defects.

1°. By reason of the double Frame, the Leg may be raised more or less for the Satisfaction of the Patient, who finds relief when his Leg is rais'd, or let down, not being able without Pain to continue long either in the one Posture or the other; and one may change it without fear of the Bones displacing, because the alteration depends only upon the Flexion or Extension of the Knee, which Motions may be made by the means of the upper Frame, without running the Risque of displacing the Bones.

2°. The Pallet having degrees of resting, upon the Cheeks of the under Frame, may raise the Leg safely to any degree that is convenient for the Patient in his Dressings, or in the Intervals.

3°. As Complicated Fractures ought to be dress'd every Day once or twice, and as at each

each Dressing one must raise and let down the Leg, that these Motions may not be prejudicial to the Formation of the *Callus*. It is observable that one may raise the upper Frame, and consequently the Leg, till the Pallet be at its highest degree of Elevation, then have the Leg held by two of the Surgeon's Men, and bow down the upper Frame to draw it from beneath the Leg, and give to an Assistant who must clean it, and trim it with a new Bandage, after which it must be replaced under the Leg at a height proper to receive it; by this means avoiding the Hazard one may run by having two Persons not equally Strong nor Skilful, either to raise or let down the Leg.

4°. The Ticking that is in the upper Frame makes a sort of Girth-Bed, whereupon the Leg is much more commodiously situated than on the Floor of the old Case; the Calf of the Leg and the Heel form themselves a lodging therein, and the whole Leg seems to adapt it self to it.

5°. The Arch of the Cheeks of the upper Frame, which is at the bending of the Knee, is very useful, by reason it gives liberty to the Leg to bend, which contributes not a little to the preventing of that intollerable Pain which almost all feel, whose Legs are put in the ordinary Case; the rather because the principal Cause of this Pain proceeds from the Tension of the Tendon of *Achilles*, which one relaxes by bending the Leg, because the two Muscles *Gemelli* which compose it with the *Soleus*, take their Origine from the Condyles of the *Femur*, and pass by the Articulation of the Knee.

6°. The

6°. The lower Frame receives in its square the swagging of the Quilt press'd by the weight of the Leg, which retains the Case and hinders it from sliding down towards the Feet of the Bed, an advantage which the common Case has not.

C H A P. XV.

Of the Rupture of the Tendons that are inserted at the Heel, and are call'd the Tendons of Achilles.

TH E being convinced of a Fact, or the doubting of it, is not always what induces Persons to grant or denying it. 'Tis the weakness of certain Men, that self Love determines them more than the Truth; an Absurdity is granted upon a single Relation, and the Truth (even when demonstrated) is call'd in Question.

Who can believe, says one of these Weak— Who can believe that the Tendons can break with a Strain? Their Structure alone convinces me that 'tis impossible. Besides D— who has seen the pretended Rupture which they quote for an Example, says that the Allegation is false.

When this Man speaks thus do you believe he gives credit to what D— says? No, he knows him too well. Nevertheless this Witness tho' false, tho' weak, is sufficient to determine him to take that part that flatters his self Love, because
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he thinks to injure my Reputation ; but he is mistaken, having no other object but the Truth, I despise his Flings, and I dare (for any thing that regards him) believe my self invulnerable even in the Tendon of *Achilles*.

Experience which I take for a Guide, and which is so to all who search after truth, has let me see several Times that the Tendons were apt to break. I have given some Memorandums upon this subject to the Academy of Sciences ; what I shall say here is but an Extract, but 'twill be sufficient for young Surgeons, for whose Benefit I write this Treatise.

It seems difficult for a strain only to break the Tendons of *Achilles* ; 'tis nevertheless what I have seen, and shown to several of my Brethren.

The *Sieur Cochoix*, one of the most active Leapers in his Troop, broke the two Tendons of *Achilles*, in a Leap he took with his Feet close, upon a Table three Foot and a half high, without making any External Wound. This Rupture happen'd so, that the Muscles of the Calf of the Leg carried away on their side the greatest part of the Tendons, and the Heels retain'd the rest. The Part which remain'd at the right Heel was above two Inches long, and that which kept at the Left but 12 or 13 Lines. The broken Ends were so far distant from each other, that one might find under the Skin room enough to put three Fingers in the space that was left between them. I dress'd this Wound till I brought it to a perfect Cure, and the Case seem'd to me so singular, that I thought I ought to communicate it the Publick.

What I have to say upon this Head is reducible to three Things, *viz.* how this Rupture

ture was made; how Art and Nature conspired to cure it, and lastly the Explication of three singular *Phœnomenas* that were observ'd therein.

That one may comprehend how this Rupture cou'd be made, it must be observed, first that in our natural State, when we stand exactly upright, the Line of Gravity passes thro' the middle of the Bones of the Thigh, Leg, and Foot: These Bones at that time mutually support each other, as do the Stones in a Column, and our Muscles hardly act at all. On the contrary they act very much to sustain our Bodies when our Joints are bent, and their Contractions are so much the stronger as the Flexion of the Joints is greater; and they may be even bent to such a pitch that the weight of the Body, and the Muscles that keep it in an *Equilibrium*, will make an Effort upon the Bone the utmost of their Power; then the *Apophyses* where the Muscles are inserted may be broken if the Muscles resist; but if the *Apophyses* of the Bones are strongest, the Rupture will be in Muscles or the Tendons.

All the World knows that the Bone of the Knee will break by a strain: By a like Cause I have seen the Tendons of the *Extensores Recti* of the Knee broken. Mr. Poncelet my Brother Member, a famous Surgeon, cured a Man who in a false step broke the Bone of his Heel by the sole Retraction of the Tendon *Achilles*.

If the Muscles, the Tendons, and even the Bones may be broken by Causes so slight to all appearance, without doubt they wou'd scarcely be able to resist, when the Muscles are oblig'd to act not only to bear up against the

weight of the Body, but even to raise it with Strength, carry it off the Ground and shoot it into the Air, as Leapers do when they jump with their Feet together upon the edge of a Table.

In leaping thus they bend their Head and their Body upon their Thighs, their Thighs upon their Legs, and their Legs upon their Feet, then in an instant relaxing all the Muscles, as if to take their Spring, they put them into that sudden Contraction which makes a Rebound against the Earth, whence they shoot themselves into the Air, and straiten on coming upon the Table.

Altho' this strain seems sufficient to break the Tendon of *Achilles*, and several Leapers have hurt themselves in taking such Springs, that of the *Sieur Cochoix* was much greater, the Table whereon he leap'd was too high, his Spring did not raise him enough, and only the Ends of his Feet touch'd the Edge of the Table, where they rested but long enough to straiten themselves, and break their Determination forwards; the Line of gravity not falling upon the Table, the Leaper came to the Ground directly upon his Tiptoes, extended in such a manner that the Tendons of *Achilles* were, if I may so say, surpriz'd in their strongest degree of Tension, and the fall of above three Foot added to the weight, a force more than sufficient to break them, since it was what the weight of the Body had acquir'd, multiply'd by the swiftness of the Fall.

Art and Nature labour'd in Conjunction to effect the Re-union of these broken Tendons.

Art was absolutely necessary thereunto, whether it were to bring together their separated Ends, or to keep them, when brought together, whilst Nature was at work for their Re-union.

To perform the first Operation, I laid the Patient upon his Back, bent his Ham, thrust the Calf of his Leg towards the Heel, and brought his Heel towards the Calf, by extending the Foot till the two Ends of the broken Tendon touch'd each other. Whilst the Parts were held in this Posture, I steep'd a double Compress in Brandy, with which I encompass'd the wounded Part; and I put another call'd longitudinal, which was thicker than the first, two Inches broad, and two Foot and half long behind, from the Ham to beyond the Toes, covering the Calf of the Leg, the Heel, and the Sole of the Foot. To fasten this Compress, I took, whilst they held it thus, a Fillet four Ells long and two Fingers broad, with which I made four rounds about the place where the Rupture was, in which rounds I made fast the middle of the Longitudinal Compress; then carrying the Fillet obliquely from without inwards over the Foot, I brought it a-cross under the Sole; I fasten'd the Longitudinal Compress again in this Place, and coming back from within outwards obliquely over the Instep, making a *St. Andrew's Cross* with the first oblique turn; I carry'd the Fillet over the Ankles where I made a circular Cast, and whence I came back obliquely from without inwards over the Foot, under the Sole, and then again upwards to make a second Time a *St. Andrew's Cross*, and a Circular Cast over the Ankles. Having repeated these same Cir-

cumvolutions four Times, and the Fillet being come to the Ankles, instead of going again downwards towards the Foot, I went upwards in Circles to the Calf of the Leg, where I had what remain'd of the Bandage held, that I might with both Hands reverse the two Ends of the Compress that were not yet made fast. The End at the Ham was revers'd towards the Heel, and that at the Sole of the Foot was turn'd back towards the Leg, I fasten'd them with Pins, and with the rest of the Fillet which I pass'd several times over them at different Parts of the Leg and Foot. These two Ends of the Longitudinal Compress being thus fasten'd and revers'd the contrary way one to the other, kept the Foot in its last degree of Extension, so that the Ends of the Tendons were not only brought near, but touch'd and mutually thrust against each other.

Having apply'd this Bandage to one of the Feet, I did the same to the other; then I placed a Pillow under the Hams to keep them bent, relax the *Gemelli*, which by their Contraction might have drawn the upper Part of the broken Tendon upwards. I steep'd the dressings of both the one and the other in Brandy, and I order'd them to be moisten'd afresh every four Hours, I bled the Patient that very Evening, and twice next Day, and prescrib'd him a Regimen.

Eight Days afterwards I took off the Dressing, and found the Parts favourably dispos'd towards a Cure, at the Fifteenth I took it off again, and the dispositions seeming yet more favourable, I did not at all doubt of his Recovery: The Twenty second, some slight motions that I made in Dressing him confirm'd

me that the Re-union was made; and the Thirty second Day, I found him by the Fire, whether he had made himself be carry'd, and he told me that he believ'd he cou'd perform his ordinary Exercifes.

'Tis not to be doubted that Art had a great share in this Cure, but without the help of Nature all my precautions had been vain: Not contented with finishing the Nutritive Juice which folder'd the Tendons, she made the Sheaths that cover them serve as Moulds; without them the Juices would have spread in the neighbourhood, the Scar would have been too weak, and the Tendons wou'd have contracted an adherence with the Parts adjacent, which would have depriv'd them of that facility of Slipping, which renders them so proper for motion.

I shall finish this Observation with explaining three *Phenomenon's* that are very singular; the first is that the Patient extended and bent his Leg the instant after the Rupture of his Tendons, the second is that he cou'd not stand, the third that he felt no manner of Pain on the breaking his Tendons, nor indeed afterwards during the whole Cure.

He cou'd bend his Foot because the Muscles *Flexores* were not hurt, and he cou'd stretch it out, altho' the Tendon of *Achilles* was broken, because the *Tibiaus* & *Peroneus Posticus* which were not rent, are sufficient to make the Extension, as I have experienced in a *Cadaver* after having cut off this Tendon of *Achilles*.

The Patient cou'd not stand, because, altho' the *Tibiaus* & *Peroneus Posticus* were sufficient to extend the Foot, the Point, by which these Muscles pass from the Leg to the Foot, is too near the *Fulcrum*.

This Observation shews that the Distance of the Tendon of *Achilles* causes all the strength of the Foot, and 'tis seen, that the more this Tendon is distant from the Articulation, the more force it has. The Animals that run and leap with the most agility are those in whom this Tendon is at the greatest Distance; Men whose Heel is very long are the least wearied with walking, and the longer the Foot is, the more necessary is the length of the Heel.

If the Tendons of *Achilles* were rent without Pain, I don't believe that the Sensation was destroy'd by the premeditated Action of the Leaper; it seems to me that it proceeded from the velocity of the Motion which broke them totally, and at the same Instant.

In spite of all the Care I have taken to give exactly the Truth of this Observation, there have been incredulous Persons, whom I cou'd willingly forgive, if I were sure of the Integrity of their Intentions. I know that People may invent Lies, and that all Novelties may be suspected as such, but it is not less impudent to deny, than to subscribe to them without examination, and when one has espoused any side one is obliged to tell the Reasons that have induced one to it.

If those who have declared against my Observation upon the Rupture of the Tendons of *Achilles*, had communicated their Reasons to me, I wou'd have done my utmost to have answer'd them; but they have spared me that Trouble, by contenting themselves with saying obstinately that the Tendons cannot break. Altho' this manner of attacking me be very advantageous to me, the Truth or Falsity of this Observation is of such great Importance
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to the Publick, that I should believe my self as wanting to its Interests, and to my own Reputation, if I neglected clearing up this Point.

It may have been observ'd in one of the Dissertations that I presented upon this Head to the Academy of Sciences, that the Rupture of the Tendons only by a sham was no new thing : I have also remark'd therein that the Bones themselves, to which the Tendons adhere, are not exempted from fracturing, when the Tendons resist more than they, against a Strain that is capable of breaking the one or the other.

I have given an Account how the Lady of the President *de Boissise*, walking softly in the Court of the *Hotel de Soubise*, broke the Bone of her Heel by the sole retraction of the Tendon of *Achilles* : I have mention'd a like Accident with which Mr. *Poncelet* acquainted me, I have given an Example of *Rotula's* broken by the same Cause ; I had a Machine made for Mr. *Peron*, (a Master Surgeon very expert in Bandages) to supply the defect of the Tendon of the *Rectus Extensor* of the Leg, which a *Dutch* Officer had broken in leaping a Ditch. To these Examples I added that of the *Sier Cochoix*, and to that I now subjoin two others which have lately happen'd at the Time that I was reading Lectures at *St. Cosmus* upon this Subject.

One of these Examples is the Rupture of the Tendon of *Achilles*, which befel a Woman 35 Years old and very lusty. She was going over a Plank that lay a-cross a Boat, and her Feet slipping, she fell, to the bottom of the Boat, full upon the end of her right Foot, which rested alone upon the Edge of a Cross-

piece of Timber, (a sort of Rafter) which they call a Table. The Sole of the Foot, the Heel, and all the left Foot were without support, so that (to make use of the same Terms as in my first Observation) the Tendon of *Achilles* of the right Foot bore alone all the shock, and was (if I may so express my self) crush'd by the Weight of the whole Body, to which weight the fall, from above six Foot high, added a force more than sufficient to break it, because this force was what the weight of the Body had acquired, multiply'd by the Rapidity of the Fall.

Mr. *Granier*, the Patient's ordinary Surgeon, had me call'd in with several others of our Brethren; he apply'd the Compress and the Bandage describ'd above, and the Patient was cured in as little Time, and as perfectly as the *Sieur Cochoix*.

I have made several Observations upon this Disease.

First the force that broke the Tendon of this Woman was much greater than that which rent those of the *Sieur Cochoix*, because this Woman is very heavy, fell six Foot, and rested only upon one Foot: *Cochoix* on the contrary is light, fell from a less height by half, and both his Feet shared in the shock of his Fall.

Secondly the Patient felt some Pain near the Rupture, and *Cochoix* had none: Neither the one nor the other were sensible of any Pain at the Instant of the Rupture of their Tendons, and if the Lady felt any near the Rupture, 'twas because on her falling she found nothing to stay her self, and *Cochoix* lay'd himself against the Table upon which he leap'd, so that without this help he had fall'n
a second

a second time which wou'd have caus'd tearings : This is what the Patient cou'd not avoid, which occasion'd an *Ecchymosis* by the spreading of some drops of Blood which the broken Vessels had let escape under the Skin, and in the *Sacculi Adiposi*.

The third Observation that I have made is that Women (the Causes being equal) must break the Tendon of *Achilles* easier then Men; because the Heel of their Shooes being very high keeps that Tendon more shortned, and their Feet for this Reason are always in Extension, which gives the Weight of the Body, multiply'd by the velocity of the Fall, a great deal more power over them than it would have were the Heels of the Shoes lower.

I will subjoin to this Observation that which I have made upon the Rupture of the tendinous Ligament that fastens the *Rotula* to the Prominence of the *Tibia*.

The *Sieur Galin*, a Licenced Surgeon, sent for me to see the Son of a Perriwig-maker, in the Street St. *Honore*, over against the great Council. This Child, which was Nine Years Old, fell with his Leg bent; the sole weight of the Body forced the Leg, and carry'd it beyond its utmost Degree of Flexion. The Muscles *Extensors* were so stretched that they were in a situation to be broken, as well as the *Rotula* or its Ligament. This latter being apparently weaker than the Muscles or the *Rotula*, broke only because it had not strength to bear up against the Weight of the Body.

The Signs that discover this Rupture are,

1^o. The void space that one feels under the Skin between the end of the *Rotula* and the *Tibia*.

1^o. The

2°. The jutting out of the lower Part of the *Rotula*.

3°. The weakness of the Extension of the Leg, which is only made by the lateral Parts of the *Aponeurosis* of the *Extensors*, which passes by the sides of the *Rotula* to insert it self at the *Tibia*.

This Rupture was without Pain like that of the Tendons of *Achilles*: There was an *Ecchymosis*, because the Child had an entire Fall, not having any Body near, by which it might stay it self.

The Dressing was put on with the same view as that in the Rupture of the Tendons of *Achilles*; a Compress 18 Inches long, and three Fingers broad, reach'd from the middle of the Thigh, passing over the Knee towards the middle of the Leg. The crossing of the Bandage was placed under the Ham, the two circular Casts fasten'd on the Compress, the one above, and the other below the *Rotula*.

After several rounds of the Bandage had thus fasten'd on this Compress, the Ends were turn'd back contrary-ways to each other; that which went up the Thigh was revers'd towards the Leg, and that which was upon the Leg, was turn'd back towards the Thigh; then the unfolding of the rest of the same Band was made use of in circular Casts, to bind on these two revers'd Ends of the Compress, so that the Leg not being able to bend, the two Ends of the broken Ligament might enjoy their mutual Proximity, and Rest, two things equally necessary to procure their Reunion.

C H A P. XVI.

Of the Exostosis, and the Caries.

TH E S E two Diseases are the most fatal that can affect the substance of the Bones: They have a resemblance, the one to the Tumours, and the other to the Ulcers that seize upon the soft Parts; and as the Ulcer follows the Imposthumes that suppurate, the *Caries* is the necessary consequence of the *Exostoses* that suppurate: 'Tis for this Reason that I comprehend these two Diseases in the same Chapter.

The *Exostosis* is a Tumour that rises above the natural surface of the Bone; it causes often very acute Pains, at other Times they are moderate; it is often without any Fever; sometimes 'tis attended with one that is pretty violent, and proportionable to the Pain: There are some that are only accompany'd with a slow Fever, and those are not the least fatal.

Definition
of the
Exostosis.

There are some *Exostoses* that are caus'd by Blows, Falls, and other external Causes; others are occasioned by the vicious quality of the Blood.

Some terminate by Dissolution, others suppurate, others remain hard, and rais'd, without terminating either after one manner or another, just as Imposthumes, whereof some are Critical, and others Symptomatical.

The different
Kinds.

The different Bones, and the various Parts of the Bones which this Disease affects, might make particular Kinds; for if the *Exostosis* is a Tumour of some Part of a Bone, 'tis also often the swelling of a whole Bone. One sees the

the middle or the Extremities of a Bone swell'd separately, one also finds the Tumour extended all over it.

The Bones that are not entirely affected with an *Exostosis*. Those which are affected throughout.

The *Femur*, the *Humerus*, the *Tibia*, the *Perona*, the *Radius*, the *Cubitus*, the *Ribs*, and the Bones of the Hips, and *Cranium* are not generally afflicted with an *Exostosis* all over them.

When the Bones of the *Carpus*, *Metacarpus*, *Tarsus*, *Metatarsus*, *Vertebra*, &c. are seiz'd with *Exostosis*, it usually affects them throughout their whole Dimensions.

Altho' the *Exostosis* affects but one part of a Cylindrical Bone, it may swell it quite round, and in this Case the Bone will be rais'd throughout its Circumference. At other Times the *Exostosis* affects but one side only, and the Bone is only rais'd in one of its Surfaces, whether it be that which is before, or that which is behind.

The *Exostosis* that attacks the Bones which serve as Boundaries to some Cavities, may either jut outwards or swell inwardly. There are every Day to be seen some that break out externally upon the Bones of the *Cranium* on the *Sternum*, the *Ribs*, and the *Ossa Ili*a; and there have been seen several that were not visible outwardly, which nevertheless by their growing caused dreadful Accidents, as shall be remark'd in the sequel of this Chapter.

The different Consistence of *Exostoses*.

There are some *Exostoses* that render the Bones harder, and others that make them more spongy: 'Tis very rare for a Bone attack'd with this Distemper to retain its natural Consistence.

I have saw'd some *Exostoses* with ease, because the Bone at the Top was spongy, with others I have been put to a great deal of Trouble,

Trouble, because their Hardness was increas'd; some make more resistance than Ivory.

In the Examination that I have made of the *Exostosis* when sawing the Bones, I have often observ'd that the Consistence was not the same throughout the whole; some were softer without, and harder within; others on the contrary were softer within, and harder without, so that neither the Consistence of the one nor the other was like that of the natural Bone. In some I have found Flesh, in others a sort of Mucilage, in others *Pus*, and in others again a *Sanies*: Sometimes I have found the *Exostosis* as it were wrapt in a bony *Lamina*, as hard as the Enamel of the Teeth, and the inside more spongy then the *Epiphyses*. When I say wrapt in it, I mean that the Part of the *Exostosis* which stuck to the Body of the Bone was of the same hardness, and that that place being saw'd according to the Diameter of the *Exostosis*, one might see the Continuation of the hard cover, which was even whiter, and much more close than the sound part of the Bone.

There is hardly any one who has not seen *Exostoses* that have risen to a great height upon the Body of the Bone, and which scarce adher'd to it at all; others which were only join'd to it by a very narrow *Basis*, having a very large Body and Summit; others again very flat, and of great extent which were (if I may so speak) but like an incrustation of the Bone, from which they were separated with Ease.

One may reckon among the sorts of *Exostoses* what certain Authors have improperly enough call'd *Spina Ventosa*. 'Tis an extraorpinay Disease, differently treated of, nevertheless I believe we ought to give more Credit to the

English

A particular *Exostosis* call'd *Spina Ventosa*. *English* than to any others, because it often happens in their Country, and yet more in some Islands in the North that are under their Jurisdiction. It is thus describ'd by the Physicians of that Nation.

It begins to discover it self by Pains both in the Bones and soft Parts, which alter every Minute. Sometimes sharp *Exostoses* break out, whence the Pain is so Acute, the Bones become soft, and as it were dissolved, which occasions their breaking every where; they no longer being hard enough to keep an *Equilibrium* with the Muscles: At other times they are Rotten, and as it were Worm-eaten; it is often attended with a *Tabes* in some particular Part, and sometimes all over the Body, the Mortification of the Limbs follows, and there are some Skilful *English* Physicians who believe that the Plague of *Athens*, describ'd by *Thucydides*, was accompany'd with the *Spina Ventosa* it self, because they write that the Limbs, of those, who were seiz'd with it, rotted off piecemeal.

It is also very probable that the Disease describ'd by Mr. *Saviard*, in his Chirurgical Observations, is a real *Spina Ventosa*, as well as that which we find in the famous Mr. *Courtial's* Remarks upon the Diseases incident to the Bones.

Causes.

The Causes of these Distempers are Internal, or External; they may also be divided into those which proceed from the vicious Quality of the Juices, and those produced by the disordering of the Vessels; What is certain is, that either the one or the other, conjointly or separate, may produce this Distemper; whether the Disorder of the Juices has caused that of the Vessels, or the latter has occasion'd

tion'd the vicious quality of the former, or whether External Causes have produced both the one and the other.

One thing essential to be known, is that the Diseases of the *Periosteum* may occasion the *Exostosis* and the *Caries*. Before I proceed any farther upon the Causes of these two Diseases of the Bones, I will give my Thoughts upon this Head, which will not a little contribute to the having true Ideas of the Formation of the *Exostosis* and *Caries*.

That one may rightly conceive in what the Indisposition of the *Periosteum* contributes to the Diseases of the Bones, it must be observed, 1°. That the *Periosteum* is elastick, adhering to the Bone throughout the whole extent of its Surface. Structure of the Bone, which gives a just Idea of the Formation of Exostosis.

2°. This Membrane is pierced to give passage to an infinite number of very small Vessels.

3°. These Vessels go some way between the Surface of the Bone and the *Periosteum*.

4°. There are little Clefts in the Surface of the Bones which are only made by the Pulsation of the Arteries, and to lodge these little Vessels.

5°. The Bones are hard Bodies capable of resisting the Penetration of the Juices; this being so, I reason thus. The small Vessels which are between the *Periosteum* and the Bone, can not be fill'd by the Motion of the Heart without being dilated, nor be dilated without raising up the *Periosteum*. But because this Impulsion of the Heart ceases and begins again every Instant, this Dilation must cease, and be follow'd by the Action of the *Periosteum*; this I look upon as a Spring bent upon the Surface of the Bones, which coming to be unbent,

unbent, compresses the Vessels against the Surface of the Bone which resists, and forces the Blood and the *Lympha* with more swiftness even into the most remote Pores of the bony Fibres: These Actions and Re-actions end, and begin again every Instant, wherefore the *Periosteum* must also be rais'd each moment by the Vessels that lie underneath it, and must be levell'd by its Spring. This is the Office of the *Periosteum* in its natural State, but if by any Cause whatever its Spring is relax'd, it can no longer quicken the Motion of the Nutritive Juices which the Vessels bring and carry back, whence Obstructions will happen that will be follow'd by a *Caries* or *Exostosis*.

The Internal Causes
The Rickets.

The internal Causes are the Rickets, the Scurvy, the Pox, the King's-Evil, or Cancers.

Observation.

We have every Day examples of rickety Children that have *Exostoses* in the Body of their Bones, or even in their Joints. Those which are in the Body of the Bone, render it apt to be fractur'd: I have often known Fractures in the Bones of the Arm, the Fore-Arm, and the Thigh which had no other external Cause but a Strain. I can't without Pain see them drag Children by their Arm, the most of those whom I have known thus hurt, had been roughly haled, either to make them get up a Stair, step over a Kennel, or go faster then they wou'd, or perhaps cou'd. Those whose Thighs were broken had fall'n; nevertheless there are some who have been in this Case, purely by the Negligence or Brutality of those who carry'd them in their Arms, by their having let them fall back, and be carry'd away by the weight of the Body,

Body, whilst their Thighs being held in their Arms were obliged either to bend or break, not being able to bear up against it.

The *Exostoses* that cause these sorts of Fractures, Observa- happen only because they render the Bones tion. more brittle: There are several to be found at the Ribs and their Cartilages; the *Epiphyses* of Children that are ricketty are almost always affected with them, I shall explain the Cause that produces them in the Treatise of the *Rachitis*; only it must be observ'd that if the *Exostosis* in the middle of the Bones is an occasional Cause of Fractures, that of the *Epiphyses* of the Joints produces occasionally Luxations or *Anchyloses*.

The Scorbutick *Exostoses* are uncommon; The Scor- the Scurvy will rather produce a *Caries* than butick an *Exostosis*; nevertheless 'tis sometimes seen, Causes. but 'tis observed, 1^o. That they are not so Three Ob- high as the other, 2^o. That they don't hap- servations pen in all sorts of Scurvy, and that 'tis usually in that which is complicated with the Rickets, the King's-Evil, or the Pox, 3^o. That *Exostosis* never come in the Scurvy but at the Beginning, when the Blood and the *Lympha* are coagulated; for when the Scurvy has continued long enough to cause Solution of the Blood, it will cause a *Caries* sooner than an *Exostosis*.

Towards the end of the Year, 1692, and Observa- the beginning of 1693, I saw a number of tion. Scorbutick Persons at the Hospital of *Bouvigny* near *Dinan* upon the *Maeſe*; an Hospital where there was always between 4 and 500 Persons Sick of this Disease, and yet I saw but three who had the *Exostosis* and above 100 the *Caries*.

The *Exostosis* were all at the Bone of the lower Jaw, in that Part where the greater

Grinders are situated, the Jaw was only one third larger than its natural State. Nevertheless I have seen a Soldier in the Hospital of *Dinan*, who died of the Scurvy, and whose Foot was considerably swell'd, hard, and without Fluctuation; I open'd it, and observ'd that all the Bones of the *Tarsus* and *Metatarsus* were *Exostos'd*, and the *Periosteum* swell'd by a coagulated *Lympha*.

Observation.

The Persons in the Hospital of *Bouvigny* who had the Scurvey complicated with a *Caries* were the most unfortunate; almost all of them dy'd, excepting those who had a slight *Caries* in the *Alveoli*: I observ'd in those that I open'd that the *Periosteum* was loosen'd from the Bone in several places, and that in many it was loosen'd from all the Bones of their Body, so that making an Incision along the Ribs, I found them naked, rugged, uneven, separated from their Cartilages, and adhering but little to the Ligaments and Tendons that are fasten'd to their hinder Part. From under the *Periosteum* there came out a dark blackish *Lympha*, inclining to a dark red, which had insupportable smell: And I found the same thing in making an Incision to the Bone, along the Arms and Legs; in some of them I drew out the Bones entire, excepting their *Epiphyses*, which were retain'd by the Tendons and Ligaments, and this only happen'd to new recruited Soldiers, of which we had a great number. They fell into this Distemper thro' the Fatigue, the Misery, and the bad Nourishment of those Times; and perhaps too by the Melancholly that had seiz'd upon their Spirits on seeing themselves in an Hospital, and remembering their Father's Houses, the Loss of the sweets whereof they regretted.

Observation.

This

This Recital is not made without Reason, the Scurvy is hardly ever caus'd but by Fatigues, Misery, bad Diet, and above all Anguish of Mind, and Melancholly.

Sailors after a long Voyage, wherein they undergo all sorts of Calamities, are very often afflicted with this Distemper. I don't pretend to exempt those from this Disease who lead a voluptuous idle Life, eating only luxuriously, as the first fall into this Illness thro' a bad Digestion, the Stomach being overcharg'd in Persons that are sensual and gluttonous, digests not a jot better.

Cause of
the Scurvy.

We see Men of Prudence who are in no want of any Thing, and whose Virtue preserves them from all Excess, fall also into this Distemper, because they give themselves over to laborious Employments, are taken up with important Affairs, or Study abstracted Science: 'Tis known that nothing is more apt to disorder the Stomach in its Function; whence the same Effect happens thro' a different Cause. To all these Causes of the Scurvy one may add the Distemperature of the Seasons, the Air, the Difference of Climates, Age, and the fair Sex.

I don't pretend to determine what Nature the Blood partakes of when it is renew'd; but by a Crude and indigested Chyle, things which are problematical are not proper in a Treatise fill'd with so great a number of Facts that are incontestable, which daily Experience embellishes, and never contradicts. 'Tis this Experience which makes me look upon all these Things as a remote Causes of the Scurvey. The *Hypotheses*, upon the Nature of the Salts which form the Scorbutick *Virus*, are Arbitrary, and 'tis there that a Man of sincerity

What one
ought to
think of
the Nature
of the
Scorbutick
Virus.

cerity ought to own that his Knowledge is but very imperfect; nevertheless we will not make a particular and new Language for our selves, but using the Terms that are receiv'd we will try to draw Consequences not from Words, but from the Things that have been often confirm'd to us by Experience.

Experi-
ence is
more cer-
tain then
Systems.

I have said before that the Scorbutick *Exostoses* did not rise so high above the natural Surface of the Bones as the others, 'tis Experience that teaches us this; it wou'd be difficult for me to give a Reason for it, unless I shou'd say that the Scorbutick *Virus* being an Acid, rather corrodes than Coagulates, and that it will not so soon cause an *Exostosis* where the Juices are coagulating, as a *Caries*, the Juices whereof are known to be Corrosive. For this Reason I have remark'd that if the *Exostosis* happens in the Scurvy, 'tis but at the beginning of that Distemper, when the Blood and *Lympha* are usually in a state of Coagulation, and may cause an *Exostosis*, but this State not continuing long, they turn acid and produce a *Caries*. It must be observed that the Scurvy may be but a Pox degenerated, or else may have been occasion'd by the Pox, and in this Case there are *Exostoses* accompany'd with the Signs of the Scurvy, whereof nevertheless the Scurvey can't be said to have been the first Cause; and there may be Signs of the Pox and Scurvy both together. In the Sequel there will be certain marks given of both these Diseases, that right Measures may be taken for their Cure.

Venereal
Causes.

The Pox is the most usual Cause of the *Exostosis*, nevertheless this Symptom don't appear at the Beginning, and it ought only to be

be look'd on as one that is consecutive of the Pox. 'Tis not at all strange that a *Virus*, which is capable of coagulating the *Lympha*, should produce an *Exostosis*.

This *Lympha* is (as is known) the Vehicle of the Nutrive Juice of the Bones; perhaps 'tis the very thing that nourishes them. That the *Lympha* coagulates in the Pox is proved by all the Circumstances which attend that Distemper. We will examine this Fact in the Sequel, and I shall content my self with observing that all the Parts where the *Lympha* abounds are the Seat of the Pox. The *Glandule conglobatae*, the Skin, the Mouth, the Intestines, the Joints, and even the Bones themselves are the places where it appears, either under its usual shapes in which Case all the World knows it) or under such Masks and Disguises as conceal it so as not to be discover'd, but by those who know it to be a very *Proteus*. Remark.

If the Pox very seldom causes an *Exostosis* immediately, 'tis that the stopping of the *Lympha* in the Channel of the Bone's producing an Obstruction there is not sufficient, it must also dilate it, displace the Fibres, and gathering together there, increase by little and little the size of the Tumour; therefore the Symptoms of the Pox appear sooner in the soft Parts, on account of their flexibility, and later in the Bones for a contrary Reason. The Pocky Exostosis does not come at first.)

How often have Pocky *Exostoses* been known to come upon People who thought themselves free from the Pox, because they otherwise were in perfect Health? They had had Shankers, Bubos, or Claps, whereof they believ'd themselves perfectly cured, because they had been under the Hands of Skilful Persons, who had managed them regularly: These Skilful Men All who believe themselves free from the Pox are not so.

however fall most of them into the Error of thinking that these Distempers when encountered with Sudorifick Ptyfans, and by the *Panacea*, are radically cured without fear of Relapse, or at least of the Pox. Nevertheless they are mistaken, I dare here aver, that let the most experienc'd Surgeon take in hand the most regular Patient, who has a Shanker, a Bubo, or a Clap, and give him Ptyfans and Mercurial Preparations, I dare aver, I say, that after having so done, this Surgeon neither ought nor can assure him that he won't have the Pox.

Observation.

This manner of thinking will not be agreeable to all the World, but experience confirms it. There are Persons to be seen every Day that have the Pox, after having had Shankers, and Bubos well cured by the Remedies above-mention'd. In some it breaks out so that none doubt of its Existence, in others the Symptoms are different, which often depends upon the Time that the Patient had the Shankers, and Bubos. We will give the Reason of all these things in speaking of the Signs; there I shall make known that those who have only had Claps are not always the most fortunate.

How the Pox causes the *Exostosis*.

The Pox may cause the *Exostosis*, because that by coagulating the Juices it deprives them of the Power of gliding with Ease into the bony Channels, or of being forced thither by the Spring of the *Periosteum*, whether these Juices only penetrate into the external Part of the Bone, which forms external, or superficial *Exostosis*, which are only incrusted, or whether they penetrate into the inner Part, but the return of the Overplus is prevented by the same Cause; for it has been observ'd that the Use of the *Periosteum* is not only to cause the

Juices

Juices to penetrate the Bone, by acting upon the Vessels that carry them into their Substance, but that it is to render the return of the Overplus easy, by compressing those that carry them back into the Mass of the Blood.

If *Exostoses* may happen only by the alteration of the Spring of the *Periosteum*, it may be imagin'd that the same alteration may happen in the Membrane of the Marrow that covers the inner Part of the Cavities, or the *Cellula Diploides Medullares*, because this Membrane does the same within as the *Periosteum* without. Remark.

The *Dura Mater* in the inner Part of the *Cranium*, the Pituitary Membrane of the Nose, that of the *Sinus Frontalis*, *Maxillaris*, and *Cuneiformis* do the same; the Internal and External Cavities of the Organs of Hearing are also cover'd with Membranes, which perform the Office of the *Periosteum* on the Surface of the Bones that lie under them, and must be subject to the same Diseases, wherefore one must naturally think that the internal Part of the Bones, and their interior Substance, must as well as the exterior be liable to Obstruction, and consequently to *Exostoses* and *Caries*. Remark.

It may also be conceiv'd that *Exostoses* will happen by the vicious Quality of the *Periosteum* only, without any Virulency's being in the Mass of Blood. These may be call'd kindly, because they occasion no Pains, are not detrimental to the Functions, but with respect to the Places they affect, and moreover when open'd, one finds no Alteration, the substance of the Bone being indeed much harder, but otherwise very natural.

A fine
Observa-
tion.

I have seen five or six *Exostoses* of this kind a Soldier of the Royal *Roussillon* Regiment came into the Hospital of *Lisle*, in *Flanders*, being troubled with Stone: The Operation was perform'd upon him, he dy'd, and I dissected him, to inform my self of the Nature of a Tumor, he had had fifteen Years. It was upon the Bone of the Temples, where it had grown and swell'd by degrees, till it became of the size of a small Mellon. It resembled this Fruit so much the more, in that it was oblong, and a great many Veins that were swell'd, and branch'd out upon its Surface, represented pretty well those that are upon the Coat of a Melon.

Opening
of the
Skull.

Having laid open this Tumour and loosen'd all the *Periosteum*, I look'd upon it at first as a sort of *Hernia*, into which part of the Brain was lengthen'd; I the more readily believ'd this, because I knew that the Bone of the Temples was naturally very thin in this Part. With this Thought I open'd the *Cranium*, not on the side where the Tumour was, but by destroying the *Parietalia*, the *Coronale*, the *Occipitale*, and the Bone of the Temples on the opposite side, which I did sometimes with the Saw, and sometimes with the Chisel, the Mallet, and Incisive Pincers, so that I discover'd as much of the *Dura Mater* as was necessary to see plainly that I was mistaken in what I had imagin'd. The *Dura Mater* and the Brain had nothing particular on that side, and the Bone of the Temples was only monstrous on the outside, the inside retain'd its natural Conformation even to the least Cleft which the Vessels usually make by their Pulsation. I fancy'd the Tumour was an *Exostosis*, and I found it to be a benign one, after having taken
it

it off, and saw'd it into two equal Parts. It was as hard and as white as Ivory, there not appearing to be any Pores in any Part of its substance.

Exostoses of this kind, but very small, are often seen on the Spine of the *Tibia*, and on the *Cranium* in Persons who have no manner of Distemper, and almost all those of whom I have ask'd the Cause of these Tumours, have told me, that they had had Falls, or Blows which having bruise'd the Body of the Bone, or the *Periosteum*, were follow'd by this hard Tumour, which was nothing but the Nutritive Juice of the Bone diffus'd, gather'd together, and harden'd by length of Time.

'Tis no new Thing to see a Rising up of the Bone near the *Callus* that is form'd in Fractures, which don't proceed from the spreading abroad of the Juices of the broken Bones, but is usually caus'd by the strong and continual Compression of Compresses, or Splints that are too hard, or too tight bound. Remark.

I have observ'd in sawing the *Callus* of Persons who dy'd a long Time after the Cure of their Fractures, that the inside of the *Callus* was of an hardness like that of these *Exostosis*, and that no Pores appear'd therein, which might induce one to believe that the Juices which form the *Callus* congeal and harden, without preserving a Passage for the Vessels. If it be so, one may think that the outside of the *Callus*, which is cover'd by the *Periosteum*, or the Membranes of the neighbouring Parts, may have some Communication with the Vessels, but that the Inside has not, and subsists like the external part of the Teeth. Remark.

I can't

A very
very fine
and pro-
fitable Ob-
servation.

I can't pass over in Silence an Observation I made upon a Disease, almost like the Tumour just mention'd, of the Soldier's of the Royal *Roussillon*. 'Twas a young Man who had had it it Seven Years from the Time it first appear'd to that wherein he resolv'd to undergo the Operation. This Tumour was upon the upper and middle part of the *Parietalia* being above four Inches high and of a Conick Figure, four Inches in Circumference in its *Basis*, three in its middle, and two towards the Top, the End of which was slightly putrify'd. This Patient was recommended to me by one of my Friends, in whose presence I examin'd him, and promis'd to perform his Operation, for which reason I prepar'd him by Bleeding, Purging, and Dieting. His Eminence the Cardinal *de Rohan* recommended him to me, and order'd him all the Assistance whereof he might stand in need. This uncommon Disease made some Persons curious to see it, and enviously desirous of performing the Operation, since they got my Patient away from me by secret and underhanded Practises, such as I have never made use of, apprehended nor avoided. The Patient, who repos'd some Confidence in me, obtain'd as a Favour of these Usurpers that I might be present at the Operation; they propos'd it to me, I refus'd it, and did them a Pleasure without design. They made an Incision, uncover'd the Swelling, and look'd upon it as a *Hernia* of the Brain, whereof the Bag was made by the lengthening of the Brain. They trepann'd this Tumour, at the Place where the *Caries* was, with a great deal of Difficulty, on account of its hardness; and they introduced the *Corona* till the top of the swelling touch'd the bottom of the *Corona*,
and

and being fatigued with an Operation as laborious as unprofitable, they dress'd the Patient, and put off the rest till the next Day. They had not the same Trouble, the Fever that seiz'd upon the Patient prevented their continuing it, their rash and plentiful bleedings did not at all diminish the Accidents, and a *Delirium* that follow'd carried off the Patient.

They open'd the *Cranium*, and were undeceiv'd as to the Idea they had of its being a *Hernia*, a Notion I my self had of the Soldier's swelling, but not of this, because the other had inform'd me better. The Tumour which they took off being saw'd, they found it full, hard, and as white as Ivory. I may certainly have the Liberty to make Reflections upon this Disease, especially upon the Cause of such a sudden Death, but if I say nothing of it in this place, I reserve to my self the right of speaking thereof hereafter in the Cure of *Exostoses*, a subject whereupon this has some Dependence.

If there are *Exostoses* whose infides are Remark. harder than the Bone, as has been observ'd in the different kinds, there are on the contrary some that are only bony at the outside, and which far from being hard at the inside, are entirely soft and fleshy. This Difference certainly does not proceed from the Cause, that is the same, I mean that Strokes, Falls, and the Disposition of the *Periosteum* may produce both the one and the other *Species*, what occasions the Difference is the turn which the Nutritive Juice that is diffused takes, a thing that can't be clearly explain'd, and which I leave to go on to what is clear, certain, and, I may venture to say Useful.

This

A very
curious
Observa-
tion.

This sort of *Exostosis* whereof I have just been speaking is more common than is thought for, and as it generally comes near the *Epi-physes*, there is reason to believe that the middle of the Bones has not a sufficient number of Blood-Vessels to contribute to its Formation.

I perform'd a very singular Operation, which I am going to relate, on account of such an *Exostosis*, and tho' this is not the place for it, I am perswaded it will be agreeable to the Reader.

A Man of about 40 Years old fell off his Horse, and got a slight Wound upon the Skin that was rais'd up by an *Exostosis*, which for 20 Years had ben forming by little and little upon the upper *Apophysis* of the *Tibia*. This *Exostosis*, tho' twice as large as his Fist, was was not troublesome, but in bad Weather.

After his Fall he had recourse to the Surgeon of his Part of the Town, who omitted nothing in the Cure of his Wound that might procure its Re-union. It seem'd to heal, when a continued Fever with Paroxysms induced him to send for M. Toneliet, Doctor Regent, and a very skilful Physician, who took him in hand methodically, but no purpose, which made him think there might be some hidden Cause, and suspecting the Wound for all its good Condition in appearance, he had me call'd in. I introduced a *Stillet* into a little place in the Wound, and I discover'd a Bag of purulent Matter, which I open'd to the Bottom, where I perceiv'd a little Hole, thro' which my *Stillet* penetrated to the Bone, the Teguments whereof I found loosen'd about the bigness of the Palm of the Hand. An Incision in the form of a (T,) and the extirpating

tirpating off the two Angles, having laid it open to view, I perceiv'd a Piece of Bone of a triangular Figure, which being separated from the whole, was sunk in a little, and no longer kept even with the Rest. I thought that I must raise it and draw it out, which I cou'd not do till I had first cut away sloping a Part of the solid Piece, with strong Scissars. By the help of this sloping I ran a *Myrtle-leaf* under the Piece that was sunk in, and I took it away, making use of this Instrument as an Elevator, which done, there issued out a stinking Pus. This Piece being taken away, I had liberty to thrust my Fore-Finger into the opening, and I found that this Tumour was nothing but a Lump of Flesh enclosed in a bony Case, which was thick on that side of the Bone to which it adhered, and so thin every where else, that some Parts were easily cut with the Scissars, tho' they were as hard as the middle Parts of the great Bones. I cut off enough to give me leave to loosen easily the Lump of Flesh, and to take it out in several large Pieces, which being put together, were a third bigger than the Fist. This being extracted, I put my Fingers into this sort of *Cranium*, where I found by-places, wherein were Pieces of the same Flesh that I separated exactly, which laid the Bone almost bare. I fill'd up this great *vacuum* with Lint, the Rest was cover'd with Pledgets, and wrapt round with Compresses and Bands: He was blooded as was proper, and had a suitable Diet and Remedies.

The next Day I carry'd the Instruments Sequel.
that were necessary to break and cut away
the Parts of the Bony Cavity that had re-
sisted

sifted the Scissars, and yet formed a considerable Cavity, whose raised side made a Cavern, wherein 'twould have been difficult to have apply'd the Remedies proper for procuring Exfoliation. Besides if the Scar cou'd have been made, the Deformity would have been troublesome to the Patient; wherefore 'twas fit to take away these sides, and to level the Swelling to bring it as near as possible to the Natural Figure. The Mallet, the Chisel, and the Incisive Pincers, served me alternatively, and when I had demolish'd this bony Arch down to the Body of the Bone which served for its Basis, I dress'd it with Lint steep'd in the Tinctures of Myrrh and *Aloes*, until the Patient was on the mending hand, then all Things were made use of that procure an easy Exfoliation, after which the Wound cicatriz'd and heal'd.

Parallel
to this
Disease.

The Bony Case, and the Lump of Flesh enclosed therein, like the Brain in the Skull, will it not allow us to compare this Disease, and the Operation I perform'd, the one to the Wounds in the *Cranium*, and the other to the Trepan?

Strokes, and Falls, may hurt the Teguments only that cover the *Cranium*; and making but a Simple Fracture, one ought to attempt the Re-union, which was the Intention of the Surgeon that first dress'd our Patient. The *Pericranium* may be contused, and loosen'd from the *Cranium*, there happens an overflowing between it and the Bone, the Matter ferments, which is follow'd by Pains and a Fever, an Incision is made, the *Pus* comes out, the Tension of the *Pericranium* ceases, and the Accidents abate, which is just what beset our Patient.

The

The Fall had bruis'd, and separated the Bones from the Membranes that cover'd it; the Juices being diffused between the one and the other, by their fermenting caused the Pains, the Fever and the Imposthume, which Accidents were abated by our Opening.

In making an Incision on the *Cranium*, on the Teguments that are loosen'd, one not only discharges the *Pus*, but one lays open the Bone, and if 'tis fractured, especially if 'tis depress'd, one Trepan to take away the Piece that is separated from the whole. Had not we a fractured Bone, a Depression, did not I perform the *Trepan*, when I cut away sloping the Piece next to the Depression, to put the Instrument under that serv'd as an *Elevatory*, to raise up and take away the Bony Piece, which the Fall had forced in upon the Lumps of Flesh, on the inside of this *Exostosis*? In fine if they Trepan to raise the Pieces of Bone, they also Trepan to discharge the Blood that is diffused, whether it be fluid, coagulated, or changed into *Pus*. Did not I, by this Operation, make room for the Discharge of the *Pus* form'd under the Piece that was sunk in, a Suppuration which occasion'd the Fever and other Accidents, which wou'd infallibly have carry'd off the Patient, if by the means of this Operation the Cause had not been destroy'd?

This Parallel may be carry'd farther: The Commotion that happens in Blows on the the Head, perhaps happen'd to the *Exostosis* of our Patient; the *Pus* that was under the Piece of the Bone that was sunk in, was perchance caused as much by the Commotion as the Depression. The Abscesses that are form'd in the Cavity of the Marrow, after a Simple Contusion

Contusion of the Bone, prove sufficiently that Commotion is not the Cause of a Distemper that is peculiar to the Brain.

The Cause of Scrophulous *Exostosis* is not more easy to determine, than that of the Swelling of most Part of the conglobated Glands. They say that the *Lympha* being congeal'd produces both the one and the other, and altho' the Effects of the Scrophulous *Virus* be almost like those of the Venereal one, there is nevertheless some Difference not only between these two *Virus*'s, but also between the two same Effects of these two various Causes; and they distinguish between the *Exostoses*, *Abscesses*, *Ulcers*, *Caries*, and *Pustules* that are Scrophulous, and those that proceed from the Pox: We shall endeavour to make known the Difference, by giving hereafter the marks both of the one and the other.

Not but one may sometimes be mistaken, if one is not very careful, when the King's Evil is complicated with the Pox, or when it is only the Effect of a degenerated *Virus*. There are Persons attack'd with the *Scrophula* who can neither be suspected of having themselves got the Pox, or of having inherited it: Others may be suspected of the one or the other, sometimes both.

May not one believe that that is free from the Pox, which seizes upon a small number of Inhabitants in a Place where not so much as the name of the Pox is known? On the contrary ought not one to judge that it is Pocky when it affects a great number in a Country where the Pox is very common, because so few Persons get cured of it, that it is hereditary for so many Degrees that it degenerates, and would (to use that Expression) denote the number of their Ancestors, if some one did
not

not increase the Inheritance by new Acquisitions.

We see every Day Persons afflicted with the *King's Evil* who have been cured, and to whom it has return'd upon an impure Copulation. Remark.

Are there not Poxes observ'd in Practice, which have for their Symptoms an almost universal swelling of the conglobated Glands? Another Remark.

I have known Women who had been cured of several Scrophulous Kernels in their Youth, who on their first being with Child, or a little after, fell again into this Distemper, whether they had contracted some *Virus* from their Husbands, or whether the Milk sowering in the Mass of Blood had coagulated the *Lympha*, or lastly whether their new Condition had set at liberty the old Scrophulous *Virus*, which the Remedies they had taken had only weaken'd and palliated. Observation.

A young Woman of Twenty Years of Age, had been in perfect Health for Ten Years, after she had been cured of two Scrophulous Tumors, one in the Foot, where the Bone of the *Metatarsus*, that supports the great Toe, was almost entirely fall'n off by Exfoliation, the other at the Angle of the Jaw, where some Glands had been destroy'd by Causticks, and the Ulcer perfectly consolidated. After having been Ten Years perfectly cured to all appearance, she was marry'd. Her Husband, who had had Venereal Diseases ill cured, had a running remaining, he gave her a *Gonorrhea*, which unfortunately was only treated as a *Gonorrhea*, and that by a Person of the number of those who think that to stop the running of a Clap is to cure it. A little after this Palliative Cure of the Clap, the Glands

Observation. of the Neck, the Arm-Pit, and the Groin swell'd, the old Sores broke out afresh, the *Tarsus*, and the Angle of the Jaw were *Exostosed*. For a long Time she had only antiscrophulous Medicines prescrib'd her, because they did not suspect the Pox, but only the Return of the King's-Evil. This long and unprofitable method of Cure occasion'd a Consultation, wherein they gave a more sincere Account of what had past, than had been done to the ordinary Surgeon, and 'twas concluded that the Return of the *Scrophula* was owing to the Pox, and that the Patient must go thro' a Course of Physick, which had all the success that cou'd be expected.

Observation. 'Tis seen therefore that the Pox and the King's-Evil may cause *Exostoses*, whether one of these Diseases precede the other or no; but what is remarkable in the Scrophulous and Pocky *Exostosis* is, that they more generally suppurate than those that are only Venereal, and the sort of *Caries* that succeeds is always very fatal.

Observation upon the Small-Pox. In the Small-Pox there arise Tumours, which terminate so speedily in Imposthumes, that 'twou'd be hard to remark the four Stages which the Ancients pretended to distinguish in Imposthumations. The first thing that is perceiv'd is a Fluctuation, and altho' the Matter has made no stay there, one finds the Bones bare and swell'd, and often Rotten, which may proceed from two Causes, either from the sharpness of the Matter, or from its breeding under the *Periosteum*, or in the neighbourhood of the Bones.

I have known the Small-Pox attended with such virulent Abscesses, that they have laid the Bones open almost their whole length,

length, and have sent forth such a vast Quantity of *Pus*, that the Patients died in a *Maraasmus*, or in a *Leucophlegmatia* caused by the Solution of the Blood.

The *Exostoses* may be Cancerous; I have seen Remark.
several. A Woman of 50 Years of Age being afflicted with a *Cancer* in her Breast, sent for me to give her some Relief. What I thought the properest was to cut off the Breast, the moveable Tumour, the Arm-Pits being free, and exempt from any swelling, the strength of the Patient, her confidence in the Operation, all invited me to perform it, and seem'd to assure me of Success; the season it self was not improper, I hoped for a good Issue, and she was cured. Two Months after she was seiz'd with an intolerable Pain in the Heel without any swelling, the Part was neither chang'd in Colour nor Consistence, all the Remedies were used that are proper to assuage Pain, but to no purpose, there appear'd an *Oedema* at the Ankle Bones.

The Bone of the Heel swell'd by degrees, and the Skin became red and *Oedematous*,
an Incision was made, and the *Ca'caneum* was Observation.
found to be swell'd, bare, and rotten. They suspected the Pox, the Patient went thro' a Course of Physick, but the Disease increas'd so that the *Malleoli* swell'd, and the whole Foot falling into a Gangrene, made us resolve to cut off the Leg. There broke out of the Marrow a Cancerous *Fungus* which made a considerable progress in a little Time; it became hard, painful, black and noisome, and there issued out such a great quantity of stinking ferous Matter that the Patient sunk under it and dy'd.

Another Woman, a great deal older, had for a long time a *Cancer* in her Breast, which gave her no disturbance but now and then; she was seiz'd with a Tumour in the middle of her left Thigh, for which she had recourse to Surgery. On examining her I found that the Body of the Bone was swell'd quite round: Three Days after it appear'd to me to be more so, I judg'd that there was an *Exostosis*; the sharp and continual Pains with shootings confirmed me in this thought; and their perseverance, in spite of the Remedies prescribed made me believe that the *Exostosis* would Imposthumatate, and that the Consequence would be a *Caries*. It fell out just so, after two Months constant suffering without Intermission, till she broke her Thigh in turning in her Bed. A Tumour of the same Nature broke out in her Arm, and another at the *Clavicle*; they were not so long painful, because the Bones broke sooner than the Thigh had done.

'Tis easy to imagine how difficult 'twas to move this Woman for the least of her necessary Occasions. The Excrements, and the Urine caus'd a Gangrene in the Buttocks and the *Os Sacrum*; and she died in such a deplorable Condition that Death was a Benefit to her.

Another died of a Cancer she had had Eight Years, which had been Six Months ulcerated, but they would not let her undergo the Operation, because it had adher'd to the Ribs from its very beginning. I dissected the Part underneath to see in what the Adhesion consisted; and I found that all the Part which shou'd have been either Gland, Muscle, or Fat, was nothing but an uniform

uniform Lump of Flesh, almost as hard as the Cartilages. The Ribs that served as a support to this ulcerated Tumour, form'd *Exostoses* in that place that were even a little rotten.

The *Caries* is a Disease very common to *Cancers*: The *Cancer* of the Nose becomes a Distemper of the Bones almost as soon as of the Flesh, and the *Caries* that follows it has often something particular in it, which I can't pass over in silence, but which 'twill be hard for me to describe, and make understood by those who have not seen it. 'Tis not a *Caries* with Worm-holes; it seldom happens to be swell'd as in the *Exostosis*, but the Bones wear away, and fall off in such small Pieces, that they disappear without one's perceiving any Splinters, excepting it be the last Piece that falls off which is pretty large, because the Matter seizes upon the Suture that joins it to the Jaw-bone. When this last Part of the Nose-bone comes off, the Piece of the Jaw-bone, to which 'tis join'd, does not seem rotten, nevertheless the *Cancer* increases, and the Bone wastes without its being perceiv'd to be bare, or any Splinters being seen to come from it; on the contrary 'tis always hidden by a spongy Flesh, which might, I think, be compared to the Ashes that hide the Fire which consumes a Match or rotten Wood.

I have sometimes seen the Bones fall off whole, as that of the Nose, the *Unguis*, the inferior spongy *Lamina*, and even the Bone of the *Pomum*; but this only happens in those *Cancers* of the Face, that seize upon a great Part at one Time: The *Vomer*, the *Os Ethmoides*, the *Sphenoides*, the *Coronale*, and the

Os Maxillare, fall off always by imperceptible Pieces, because they are of too great extent to be universally attack'd at once.

Besides these Examples of *Exostoses*, and Cancerous *Caries*, Mr. *Malaval* a Sworn Surgeon, and very famous, shew'd me a Cancerous *Exostosis* that seiz'd upon the upper Parts of the *Tibia* and *Perona*, near the Knee; but as he intends to publish this Observation, I shall give no account of it.

The formation of this Flesh upon the Bones in proportion as they decay and disappear, is a *Phænomenon* hard to be explained, but there is yet more Difficulty to account for the *Metamorphosis* of the Bones into Flesh, a Disease which I shall call the Camification of the Bones, because that from being hard, as they are naturally, they change into a substance altogether like Flesh, as will be seen by the following Observations.

A Man of 50 Years Old had been for 18 Years afflicted with Pains in his Head, settling a little more on one side his Forehead than on the other; he bled very violently at the Nose: He went to *Forge*, and the Waters relieved him a little, but on his returning home the bleeding and Pains came again, which was follow'd by two *Polypus*'s in the Nose, a redness in the left Eye-lid, the *Adnata Tunica*, and the great Angle near the Nose. There appear'd under the Skin of the great Angle a little soft Tumour, being almost without Pain, and diminishing when press'd with the Fingers, because it discharged it self partly into the Nose, and partly into the Cavity of the *Palpebræ* by the *Puncta Lachrymalia*. The Matter was a purulent *Lympha*. This is almost the Account I had of it in a Memorandum

morandum that was sent me, to which I answer'd, that if the Patient cou'd give us any Insight into the matter, he might perhaps open us a shorter and more certain Method of Curing him. He took a Resolution to come to *Paris*, where his Presence instructed me much better, both by the Examination I made outwardly of his Ail, and by a Conversation we had together, wherein I learnt several Circumstances which let me into the Nature of the Disease.

On examining his Ail, I made all the following Observations,

1°. That the left Eye was farther from the Root of the Nose than the right, by almost a Finger's breadth.

2°. That the Ball of this Eye stuck out more than that of the Right, by a Finger's breadth.

3°. That there was under the soft Tumour at the great Angle, another swelling which was harder and resisted the Touch, and that far from disappearing on Compression, as the first did, it was much plainer to be seen, when the Pus was discharg'd out of the other.

4°. I observ'd in this Tumour a very considerable Aneurismal Pulsation; this Pulsation was felt even at the great Angle of the other Eye, at the little Angle of that which was indisposed, and one might perceive it very strong on touching the two *Polypus's* with the Finger; it was even so considerable that one might see the Finger rais'd up, when laid upon the swelling, by this Pulsation which answer'd perfectly to that of the Arteries, so that on touching the Pulse and the Tumour both at a Time, there was such an ex-

and Conformity, that one might observe an Intermiffion of the Pulsation, every Ten Vibrations, both in the Pulse and the Tumour.

What cou'd one think of fuch a fwelling, and its Pulsation, but that it was an *Aneurifm*? Nevertheless I did not judge it fo, and I gave the following Reafons.

1°. The *Aneurifm* is a foft Tumour, and this is hard.

2°. The *Aneurifm* goes in again, and this Tumour does not.

3°. The *Aneurifm* is accompany'd with a whiffling and hissing Noife that is perceivable by the Ear, and even by the Touch, and this fwelling has neither the one nor the other.

4°. I cou'd not imagine that Arteries fo fmall as thofe at the Part which was affected cou'd form fo confiderable an *Aneurifm*. 'Twas objected that the leaft Arteries can dilate themfelves extreamly, and produce great *Aneurifms*; I answer'd that it was true, but that they had no Pulsation, or at leaft fo little that it cou'd not be perceiv'd by the Touch, which was not the Cafe of the fwelling in Queftion, wherein the Pulsation was as ftrong as that of the *Carotid* Arteries.

Thefe *Phænomena* are I confeß very hard to explain, nevertheless I will endeavour to fatisfy fuch Perfons as will be contented with the probability of Explanations drawn from the Structure of the Part, and from different Observations that can't be call'd in Queftion.

I thought that the Difafe was a *Carcinoma*; I mean a flefhy Body, which being form'd
in

in the spongy *Lamina* of the *Ethmoides*, had grown and spread on different sides.

The Patient was troubled with a Stoppage in the Nose, at the beginning, because the Diameter of the Nostrils was diminish'd by the Bulk of the Excrescence, and besides there was a swelling in the Pituitary Membrane, by reason of the Compression which this Tumour caused in the Blood Vessels, which occasion'd the Pain in the Head, and the Bleedings at the Nose.

'Tis known that the Communication of the Internal and External Veins with each other, was only settled that these Vessels might be a reciprocal Relief to each other, in serving mutually to discharge one another: If the Internal Vessels of the Brain, that are next to the Part affected, can't empty themselves into the Vessels, that are kept stop'd by the Part indisposed, this alone must cause a Disorder in the Brain; but this Obstruction can not last, because this Communication was only establish'd for urgent Cases, as when there is a Disorder in the one, then the Discharge is made into the Vessels of the other. Besides 'tis known that when a Part is obstructed, the Blood of the Arteries can't penetrate it but with Difficulty, and that what don't pass thro' this obstructed Part, is shared again amongst the neighbouring Arteries. 'Tis for this Reason that in a Commotion of the Brain there enters less Blood into the *Cranium*, and more into the Face: On the contrary when there is an Obstruction externally, there passes less Blood into the External *Carotid* Artery, and more into the Internal one; This is the Case whereof we have been speaking, and 'tis this supernumerary quantity

tity of Blood (if I may use that Expression) that swells the Internal Vessels, compresses the Brain, and causes the Pain in the Head..

If the Pains in the Head are inseparable from the Disease in question, ought one to wonder at the bleeding at the Nose which return'd often and abundantly, because the Vessels of the pituitary Membrane being compress'd, dilate themselves, become subject to *Varices*, burst and shed more or less Blood, as they are more or less in Diameter?

The Patient was reliev'd by the Waters of *Forge*, because they render'd the Blood more fluid, the Obstructions were abated, and had not so much power over the Vessels, wherein the Blood circulated better in spite even of the Compression which still continued.

The growing of this Flesh may also have caused the Head-ach of it self, by making an Effort to lodge it self at the Expence of the neighbouring Parts, which are, as is well known, very susceptible of Pain. The Redness of the Eye-lids was caus'd by the Compression of the Vessels that serve to carry back the Blood which passes thro' them. The Watering of the Eyes had at first but two Causes, viz. the Interruption of the Blood's Return into the Lachrymal Glands, and the swelling of the *Palpebra* and the *Puncta Lachrymalia*. By the first more Tears were produced, and the second preventing their running into the Nose, the Tears overflow'd the Eye-lids, and fell upon the Cheek.

In process of Time the Excrescence of Flesh growing larger, was a third Cause of the Redness of the Eye-lids, and of the Watering of the Eye, not only by reason the
Com-

Compression of the Vessels was stronger, but also by the Compression of the Bag of the Nose and the *Puncta Lachrymalia*. Besides there was an Inflammation in the Cavity of the Bag, attended with what they call a flat *Fistula*, which increas'g form'd a pretty high Tumour, that when compress'd not only discharg'd it self in the Nose, but in the sequel evacuated it self also in the *Puncta Lachrymalia*. 'Twas this soft swelling whereof we have made mention, and which being entirely clear'd of the *Pus*, discover'd the swelling which was not otherwise perceptible to the Eye, but only to the Touch. 'Twas also this swelling which, being Part of a greater, had been taken for an *Aneurismal* Tumour on account of its Pulsation. Nevertheless it was not one, as I have already alledg'd, and as I am going to make good by giving the Reason why there was a Pulsation, and why not the other Signs of an *Aneurism*.

In order to give a Reason for this it must be laid down for a lasting Rule that the Bones may be chang'd into Flesh; I don't only mean that they may become soft as is seen in the Rickets, (and as is cited in the daily Memoirs, and particular Treatises of the Diseases of the Bones,) but I mean that they have the same softness as the Flesh, being penetrated by the Blood, not as all the Bones are in their natural State, but in the same manner as the Intestines, the Glands and other Parts are. For the rest, one may cut them with the same Ease, they make no Resistance against the weak Efforts of a cutting Instrument, one can't discover any long Fibre therein, and in a word they are of such a nature,

ture, that being separated from the Body, no one can refuse them the name of Flesh.

To return to the Tumour of our Patient, I say, that it had its Root at the *Os Ethmoides*; this Bone was become Flesh as well as the bony *Lamina* of the Nose, the *Os Planum*, and the *Os Unguis*. The Brain beating upon the *Os Ethmoides* which was carnify'd, communicated its Pulsation to it, by reason of its softness; and as this Bone was the Root and Basis of the Tumour, the Pulsation answer'd at all the Places where the Branches of this swelling had spread: One might feel it on touching both Eyes, at each great Angle, and on putting ones Fingers in the Nostrils. This Disease is, I confess, very particular, and I shall have but very few, on my side in what I advance on this Head. All I can do to procure me some is to relate the Observations that convinced me of the Fact in Question.

First Observation. 'Tis above Twenty Years since I had a Soldier under Cure, who had a Swelling as big as an Egg upon his Instep, near the jointing of the Foot with the Leg. It stuck out under the sole of the Foot, the *Aponeurosis*, that covers the Muscles, had resisted, and forced it to spread and shew it self on the Sides. This Tumour broke, and was dress'd a long time to no purpose; and 'twas resolv'd to cut off the Leg, because the Articulation was drench'd, and neither the *Tibia* nor *Perona* could secure themselves from the rapid progress of this Swelling. The Amputation being made, I dissected the Limb for my Instruction, and in the whole Compass of the Tumour, I found no solid Part but the Cartilages that cover'd the Surfaces whereby

whereby the Bones touch'd each other. All the bony Parts had the Consistence of Glands, without any bony Fibres, unless it was in some Bones the most distant from the Center of the Tumour, wherein I found some Places that were not yet carnify'd, but which had been so, had the Operation been deferr'd never so little.

2°. Mr. *Morand*, one of my Brethren cut off a Thigh, at which I assisted; after the Operation we dissected the Articulation of the Knee, which had induced us to take off the Limb, and we found that the *Condyles* of the *Femur*, the *Epiphysis* of the *Tibia* and the *Rotula*, were of the Consistence of soft Flesh, and all the Cartilages, both of the *Rotula*, the *Condyles* of the *Femur*, and the Cavities of the *Tibia*, were of their natural hardness; they were only become thin, and even cleft in some Places, because the Bones which they cover'd were grown larger on their becoming Flesh.

3°. Observation, A Tumour broke out in the *Carpus*, near the root of the Thumb, in the shape of a Wen, Liquefiers and Resolvents were apply'd a considerable Time without Effect; on the contrary the Tumour increased. Mr. *Marechal*, first Surgeon to the King, was present, and honoured me with his Advice; which was, that I should encounter the Swelling with Causticks, by this means 'twas discovered that the whole *Carpus* was withered, and that the Bones had no support; the rest of the Bones of the Hand changed in the same manner, and we were obliged to cut off the Patient's Wrist, to save his Life. I dissected the Hand, and found that all the Bones of the *Carpus* were carnify'd, excepting the two that form the Junction
with

with the Fore-Arm; all the rest were become pretty soft Flesh, except the Cartilages: I have even kept this piece.

4^o. Observation, Mr. *Beudin*, Surgeon Royal of *Laval*, a Province of *Maine*, came to *Paris* to be cured of a Tumour that had seized on the Palm of his Hand, extended to the outside, between the Thumb and the Bone of the *Metacarpus* that supports the Fore-finger, and besides reach'd to that Part of it which sustains the Middle Finger. He was advis'd to have his Hand cut off, but the need a Surgeon has of that Part, prevented his consenting; he chose rather, with the Hazard of his Life, to suffer me to dissect his Hand to separate the Tumour from the Tendons, wherewith it was blended. After the Operation, 'twas found that the Bone of the *Metacarpus*, which supports the Middle Finger, being changed into Flesh, formed the Center of the Tumour, and made no manner of Resistance against the cutting Instrument, nor even against the *Fleam*, whereof I made use on this Occasion; which was again verify'd by the opening of his Body, which was perform'd by Mr. *de Garengot* in the presence of several Master Surgeons.

5^o. Observation, 'Tis two Years since Mr. *Leaute*, one of my Brethren, sent for me to an Operation which he perform'd upon a Tumour under the Eye, at the place where the Bone of the upper Jaw is join'd to that of the *Pomum*. This swelling, which in appearance was no larger than a Nut, extended to the Mouth, the *Sinus Maxillaris*, and the Orbit of the Eye, whence it had remov'd it so as to make it stick out a large Finger's breadth. They took away as much of this Swelling

as they cou'd, without meeting with any Resistance from the Bones, either in entering the *Sinus Maxillaris*, in finding out its Communication with the Mouth, or in following it into the Orbit, which shew'd plainly that the Bones were carnify'd, as was prov'd after the Death of the Patient. The *Os Planum*, that of the *Unguis*, great part of the *Pomum*, and the *Os Maxillare* were found to have the Consistence of Flesh, not resisting the cutting Instrument, nor even the Fingers which pierc'd them with ease. One might penetrate even into the *Cranium*, by thrusting one's Finger thro' the *Os Cribrosum* and the *Sphenoides*, which having lost their hardness, made no more Resistance than if they had been of Flesh, rather easy then difficult to penetrate.

6°. Observation, 'Tis 17 or 18 Years since Mr. *Marechal*, first Surgeon to the King, then head Surgeon of the Hospital of the *Charite des Hommes*, and always the first in the Exercise of his Profession, shew'd me a young Man of 20 Years of Age whose left Eye stuck outwards above a Finger's breadth, by reason of a Swelling that appear'd at the great Angle of the Eye, and was attended with a Pain of the Head, Stupefaction, a Watering of the Eye, and a Driness of the Nostril on the same side. This celebrated Surgeon encountred this Tumour with a Stone Caustery proportionable to its bigness. The Escar was cut to the bottom, and there came out two or three Spoonfuls of *Lympha* a little reddish, upon which the Eye return'd almost to its natural place. *Louis le Grand*, of Pious and Triumphant Memory, losing Mr. *Felix*, his first Surgeon, chose Mr. *Marechal* to supply his Place, whom the Publick had
not

not parted with without Regret, if they had not valued the Health of their Monarch more than their own. As his Business near the King made him overlook so particular a Disease, he will thank me for recalling it into his Memory, and giving an Account of it to the Publick.

The Flesh burnt by the Cautey being fall'n off, 'twas thought that the Wound cicatriz'd, but in eight or ten Days after the fall of the Escars, there appeared in the middle of the opening a Rising which seem'd to be a Bladder by its Softness, Smoothness, and the Easiness of its being thrust in again. It was open'd by a Lancet, the Water that came out was like that of the former, but in a somewhat greater Quantity: Two Days after there appear'd a third which was lanc'd after the same manner, but there came little out; the Eye removed from the Nose, and stuck out as at the Beginning; the Head became heavy, a Fever broke out, and the Patient dy'd in a little Time in a lethargick Stupefaction.

Upon opening his *Cranium* I found nothing particular in his Brain; I only observ'd that the *Dura Mater* which covers the middle and lower Lobe of the Brain was considerably rais'd up, which induced me to take away all the Brain, that I might the more easily examine into the Cause of the *Dura Mater's* Elevation. I rais'd up the Membrane by little and little, separating the Middle of the Scaly Part of the Bone of the Temple, to which it adhered, so that it was confounded with the Bone, which seem'd to me in this Place *Cartilaginous* or Fleshy. This done, I cut the upper Part of the Edge of the Orbit,

and

and when I came near that Piece of the *Coronale* that forms the Arch of the Orbit, I found that also *Cartilaginous*. Then having raised the *Dura Mater* with the *Scalper*, I found three Bladders full of a reddish Water, one in the Orbit, the other, half in the Orbit, and half in the *Cranium*, and the third in that Part of the Cavity of the Skull that is form'd by the *Os Temporis*, the Basis of the *Sphenoides*, and half the *Apophysis Petrosa*. These Pieces of Bone. and those that form the Optick Hole were of the same Consistence as Flesh, being firmer in some places, and softer in others, so this Disposition reach'd from the *Apophysis Petrosa* to the great Angle of the Eye: The *Os Unguis* and *Os Planum* were carnify'd.

Whoever would account for this *Metamorphosis* wou'd do me a Favour; nevertheless 'tis no harder to explain than the Offification of Bones; and whoever can tell how the Flesh is chang'd into Bone, may as well account for the Bones changing into Flesh.

Diagnostick Signs of the Exostosis.

The benign *Exostosis* is not hard to distinguish, especially if one reflects upon the Causes that have produced it; the absence of violent Causes, and of any fatal Symptoms:

As a Blow may be the Cause of this kind of *Exostosis*, there will no Signs of the Scurvy, Pox, or other Internal Causes, nor of the Symptoms that attend these Distempers. Not but there may happen troublesome Accidents by reason of an *Exostosis*, when th Tumour chances to be near any Part which is incommoded by its Figure or its size. For instance, I have seen one which grew perpen-

dicu'arly upon the upper and hinder Part of the External *Condyle* of the *Femur*. It caused no Pain when the Patient was either standing or sitting, nor even when he walk'd softly; but when he walk'd fast he felt sharp Pains, and perceiv'd the Noise of the *Cliquetis*, that was occasion'd by the rough Passage of the Tendon of the *Biceps* over the Tumour, this Tendon being in the Fore-part of the *Exostosis* when the Patient's Leg was extended, and in the Hind-part when 'twas bent; so that it pass'd alternatively backwards and forwards when the the Leg was bent and extended. When he walk'd softly, this Passage was made with Ease, and the Patient was put to no Torture; on the contrary when he ran or walk'd briskly, the rubbing of the Tendon against the *Exostosis* was grating, harsh, and painful.

A kindly *Exostosis* neither causes any Pain of it self, nor is the Skin that covers it red nor swell'd. I have seen one on the upper side of the Orbit towards the little Angle of the Eye, which had rais'd up the *Palpebra*, and jutt'd out so far over the Eye-ball, and the *Adnata Tunica*, that the Eye-lashes came over the End of the Tumour that appear'd, and divided it in two, so that the upper half was cover'd by the Skin, and the lower resting upon the Eye-ball, compress'd it in its upper External Part. The Patient now looking a squint, saw objects double, which is not usual, for I know those who hardly see them single; but the Reason why this Man did so was, because the Tumour that compress'd the Eye, had the same Effect as the Finger when put between the Eye-ball and the little Can-

thus ;

thus ; it changes the Line of Direction of the Eye, which causes one to see double.

The *Exostosis* of the Soldier before-mention'd upon the *Os Temporum* gave him no Pain, but he was a little incommoded when he open'd his Mouth, because the Muscle *Crotaphitis* was very much extended, and he was forced to turn his Head to see the Objects that were on that side, because the Swelling made a sort of Mountain that obstructed his Sight.

That of the Young Man who belong'd to the Cardinal *de Rohan* caus'd no Pain ; the Deformity alone made him resolve to have this Tumour rooted out, which shews that the Deformity of a Thing is not a sufficient Motive to induce us to perform an Operation that may have such fatal Consequences, since he died two or three Days after the Operation.

There are *Exostoses* near the Joint that may by their growth, either utterly destroy the Motion, or very much diminish it, by confining the Heads of the Bones within too narrow bounds. An *Exostosis* at the inner *Malleolus* was known to be benign by the Cause that had produced it, which was a blow with Bowl, and yet better by its Consequences which were not bad, since the Patient had had it Fifteen Years, and felt no inconvenience, but a stiffness in moving his Foot to bend it.

Several others might be cited which one can't call to Mind. but I believe, I have said enough to teach how to distinguish the *Exostoses* that are benign from such as are not.

I believe these *Exostoses* are of the same Nature as a *Callus*, and that in the like matter

the mis-shapen *Callus* might pass for a benign *Exostosis*, because it is not attended by any Inconvenience, and does no Injury but by its size, its shape, and its Situation.

The *Exostosis* caus'd by the vicious quality of the *Periosteum* has generally some preliminary Signs; it is ordinarily preceded by a Blow, a Fall, an old Ulcer, especially one that is *varicose*, a painful Swelling, or an *Oedemateus* Tumour.

One sees Swellings, small or great, break out upon the Leg-bone; there are few Persons but carry some proof of it. I have seen one which rose up four Lines in height like an *Apophysis Styloides* upon the middle of the *Tibia*; it caus'd very acute Pains at its first appearance, which were but slight when I first saw it, and have diminish'd by little and little, till they are come to nothing, so that at present it causes no Pain at all.

'Tis very seldom that old Sores don't corrupt or relax the *Periosteum*: If 'tis corrupted a *Caries* ensues, and if 'tis only relax'd the Bone swells, and produces an *Exostosis*, for the Reasons we have mention'd in their place. *Hippocrates* makes this remark, when he says, that the Ulcers near the Bones, which remain a Year or more, impair the Bone and rot it.

Old Ulcers are always accompany'd with a Swelling of the Body of the Bone, and I have often dissected the Legs of Persons who have had them, wherein I have found this Tumour. I have a *Tibia*, whose middle is half as big again as it ought to be; I am not indeed sure that the Person was free from the Pox, nevertheless I believe that this Swelling was not Pocky, the rather because there was a
callous

callous Ulcer in the Leg for Ten or Twelve Years.

The *Varicose* Ulcers are yet oftner attended with a Corruption of the *Periosteum*, and the Bone, when they are near them, because the *varix* is not only a Dilatation of the Vessels that are apparent, but also of the little Capillary Vessels which must empty themselves into the large ones; 'tis even partly the Reason why the *Varices* are almost always attended with an *Oedema*. Wherefore if this *Varicose* and *Oedematous* Disposition happens to the Vessels of the *Periosteum*, 'tis easily conceiv'd that the Elasticity of the latter will relax, and the Bone corrupt. I judge the same of the *Oedema* that continues a long time upon the Bone, because it produces the same Effect.

'Twill be known that the *Periosteum* is affected with the *Oedema*, when the Disease is fix'd and circumscrib'd to one Point, without there being any elsewhere. I have often seen this *Oedema* upon the Bone of the Leg, without its appearing on the Sides: It is not so apparent as the common *Oedema*, it begins deep, and afterwards spreads outwardly. When it first begins the Skin is loose over it; if you press your Finger lightly upon it the mark won't remain; if you press harder it will remain, but don't continue long, and as soon as it disappears, if you remove the Skin by pressing lightly upon it, you may feel the pitting of the *Oedema* of the *Periosteum*, which continues fix'd and immoveable, while you draw the Skin backwards and forwards over it with Ease.

All these Signs are generally sufficient for one to judge that an *Exostosis* is benign, but one may also do it by reason of the different

marks of those of contrary kinds. I mean that if the Signs of the Pox, the Scurvy, &c. are evident, and induce one to judge that an *Exostosis*, or a *Caries* is Pocky, the want of these Signs cause it to be believed not so, or at least make one suspend one's Judgment till it has been examin'd more amply, and may judiciously be determined, either upon certainty or probability.

Signs that the Exostosis is Ricketty.

This *Exostosis* is known, by being attended with the Symptoms of the *Rhachitis*, as we shall explain in a particular Discourse that follows this. I shall add here that the Ricketty *Exostosis* seizes upon young People: and that it does not always go away, altho' the Rickets shou'd be cured. Persons are seen whose whole Joints are knotted all their Lives, who otherwise are in good Health, and of these some are only mis-shapen by the Crookedness of the Bones which continues, and others by the Swelling of the *Epiphyses*, which cou'd not be dispersed nor dissolved by all the Efforts of Art and Nature.

The ricketty *Exostoses* are not in small numbers like the others, they seize upon almost all the spongy Bones of the Spine and the Joints.

Other kinds of *Exostoses* cause a great deal of Pain in the beginning, and yet more whilst they are growing: The Pain ceases sometimes when they are entirely form'd, and always when they disperse. On the contrary the ricketty *Exostoses* cause no Pain from the Time of their first Rise, to their intire Formation, but they cause sharp and cruel ones when

when they disperse, and these Pains are sometimes by fits, and at other times continual. This *Phænomenon* seems hard to explain, nevertheless I believe it may proceed from two Causes. First from the *Oedema's* ceasing at the *Periosteum*, before the Body of the swell'd Bone is recover'd, so that the *Periosteum* suffers, because that this Membrane resuming its *Tonus*, the Bone being still swell'd opposes the contraction of its Fibres, which produces the same Effect as its Tension, or else from the Membranes of the Marrow and the *Succus Medullaris*, being perhaps compress'd by the Contraction of the Bony Fibres of the *Exostosis* which happens when it disperses. However it be, this is certain, that Children are in violent Pain when their *Nodus's* begin to disperse.

Signs that must accompany or precede the Scorbutick Exostosis.

This Disease is to be known by all the Signs that shew a Melancholy Hypochondriack Disposition, whereof the Scurvy is generally the Consequence. The proper Signs of this Distemper are a Weariness and Pains in the Arms and Legs, a frequent and noisome suppuration, the Breath smells very strong, the *Saliva* is thick, viscous and sticking, the Teeth are soft, that is to say, that, being but loosely set in the Gums and the *Alveoli*, they don't chew the Food with Strength; the Gums swell, and become Red, darkish, and then Black; they sweat a sort of serous Suppuration of an intollerable smell, they bleed, and grow to that degree that

they hide the Teeth, coming over them a good way : The Gums separate from the Teeth and leave them, and the *Alveoli* doing the same, the Teeth shake and fall out easily. The *Alveoli* discover themselves, rot and fall out by Putrefaction if the the Disease continues, or by Exfoliation if it heals.

Hypochondriack Persons are tender, their Heads heavy, and all the Faculties of the Soul seem out of Tune, especially the Imagination which torments the Patient, and those that attend him ; he feels Pains in his Arms and Legs, and a Weariness in all his Limbs. He has often the Cramp in his Thighs and Legs, he falls away or becomes bloated, his Face is of a Lead colour, and his Eyes shew by their wildish Looks the Disquiet and Terrors of his Mind. 'Tis very common to bleed at the Nose ; and a *Hæmorrhage* is a very usual Symptom in the Wounds and Ulcers of Scorbutick Persons. Ulcers in the Mouth are almost inseparable from it, especially those that break out round the Gums, they also come in the Tongue, the Throat, the Cheeks and the Pallate : There have been some seen that have eaten quite thro' the Cheeks.

The Legs are not exempted, and it may be said that after the Nose and Mouth they are the Parts the most commonly attack'd by the Scorbutick *Virus*.

It has been seen in the beginning of this Chapter, that almost all the Bones of the Body or at least *Periosteum* was affected with it, since amongst the Scorbutick Patients before mentioned in the Hospital of *Bou-vignon*, there were some who had almost all the

The Bones of their Body separated from the *Periosteum*.

I should never have done if I should relate the different Symptoms that attend the Scurvy; and if one would give ear to the Discourses which Fear puts into the Mouths of Persons afflicted with this Distemper, there are none but what they feel: No Body can complain of any Disease but they think they have it. And one may add, that no body has more Faith than them in Physick, but unfortunately for them, they think to find Relief every where and without Distinction. Most part of them go from Mountebank to Mountebank till Death or a Cure decide their Fates.

'Tis therefore by these Three Signs, or some of them that the Scorbutick *Exostosis* or *Caries* must be known; I shall not meddle with them all, this is not a place for it, but as the Spots have been describ'd by Authors I shall say a Word or two of them for the Benefit of young Surgeons who are the most expos'd to the Danger of confounding them with others.

Sometimes there are Spots all over the Body, at other Times only in the Leg. The Scorbutick Spots are of four Kinds; some are of a livid or Violet Colour, and spread very much; these only come upon the Arms and the Legs, or the *Pudenda* up to the *Anus*: I have sometimes seen them on the *Palpebra*, which render'd them like those who have, as is proverbially said, their Eye poched in black Butter, that is to say black and blew. I have seen some of these Spots larger than my Hand, nay some have spread over a whole Limb. This blackness is a true *Ecchymosis*, the Blood being obstructed in the Vessels can't circulate

circulate freely, which makes it tear and burst some of them, and so diffuse it self and spread more or less, whence proceeds the black or Violet colour'd Spot, which depends upon the Blood's being more or less deep.

This Blackness is apt to alarm those who have not experience enough to know how to disperse it, and has been more than once taken for a gangrenous Symptom, but 'tis easy to distinguish the one from the other. The Scorbutick Blackness is not so dark as that which is gangrenous, it inclines to the Violet, and sometimes little red places may be distinguish'd therein, and even some that retain the natural Colour of the Skin. The gangrenous Blackness don't disperse, and this does; it may be perceived to abate by little and little, and the other on the contrary increases by degrees, and sometimes with speed. When one touches the Skin that is blacken'd by the Scurvy the Patient feels it, and he that has his Flesh blacken'd by a Gangrene does not.

The Gangrenous Blackness has more regular Bounds than that which is Scorbutick.

Now I am speaking of the Colour of the Skin in the Gangrene, I will mention an Observation which I made upon a *Negro* belonging to a Reverend Father of the Order of *St. Dominick*, that was come from *Peru*. This *Negro* had a Defluxion on the *Scrotum*; I was sent for by the Farher, who had known me ever since I had cured the *Constable* of *Navarre*, Son of the Duke *D'Alba*, whose Physician was call'd into Consultation. His Advice was not to bleed the Patient, and to give him some Powders which he did not name, nor I did not know, and

I was for bleeding him plentifully and speedily to prevent a *Gangreen*, which seiz'd him in 24 Hours, because he was not. Then I would have made Scarifications to hinder or set bounds to the progress of this Distemper, but I met with Opposition from Persons who told me that the Blackness of the Skin was an exceptionable Sign of a Gangrene in a Moor; neither was it upon the Blackness that I had affirm'd there was a Gangrene, on the contrary 'twas on the Whiteness: For I have observ'd that if the Skin of White Men blacken in the Gangrene, that of the Moors Whitens.

The black or dark Spots are not the only sort that attend the Scurvy as we have observ'd; there are some of a Purple Colour, which are of a different Form and Bigness; some are no larger than the Point of a Pin, others are as big as a Grain of Millet, others again a little larger: They come out in Clusters as of the size of a Farthing, or a Crown Piece. There are some seen as large as the Hand, which seem of a Violet and dark Colour; the first cause an Itching. I have known Patients who were sensible when such little Purple Spots were coming out upon them, they had notice of it by a light Pricking, and an Itching that follow'd it.

The third sort of Spot is red like the Bite of a Gnat, being at the Top of a Hardness that lies under it, and is more or less considerable, but generally they are as large as the End one's Finger, and resemble a Pust, excepting that the Swelling of the Pust is seen and outwardly, and that the Tumour of these Spots lies hidden in the Body of the Skin, and seldom rises outwards.

The

The middle of these Spots is redder than the Sides, whereas the Purple Spots are as red at their Sides as in the Center : The Tumour which attends these Spots disappear sometimes imperceptibly, and they return to the same place, or any other with the same Ease. Sometimes they leave no mark after their going away ; at other times they leave a slight Spot like a Bruise.

The 4th sort of Scorbutick Spot is Yellow ; these spread very much, and have not the same degree of Yellow throughout, some places are clear, others are deeper ; the Skin as one sees it in the Degrees of the dispersing of *Ecchymoses* and Contusions. All these Spots are Scurfy ; the *Epidermis* peels off and falls in Scales like Bran, or Meal.

Signs of the Pocky Exostosis.

Besides what I have said in the beginning of this Chapter concerning the Marks of the Venereal *Exostosis*, I thought it necessary to add one Word of the Signs of the Pox. It may be remembred that I have observ'd that the *Exostosis* is not a primitive Symptom of this Disease, on the contrary 'tis known that it only appears in the third Stage.

There are several Signs of a Pox ; a *Clap*, a *Shanker*, a *Bubo*, a *Phymosis*, and a *Paraphymosis* are generally the first Stages ; the Pustules are of the second ; not but that 'tis sometimes otherwise. One sees Persons who get the Pox at once, and who have *Bubos* or *Shankers* two or three Months afterwards, without having deserv'd them by any new Conversation with impure Women, 'tis observ'd every Day. I have known two Pa-
tients

tients in whom the first Sign of the Pox was Pustules; the one had been above two Years without having to do with any Woman when the Pustules came out, and the other two Months, and neither the one nor the other had ever had any other Symptoms of the Venereal Disease, but these Pustules.

The Clap, which I look upon to be a Pox, is not attended with the Symptoms of this Disease when it runs plentifully, when the Running carries away with it the Pain, the smarting and the other Accidents; when the Matter changes Colour, and becomes White by degrees; when the quantity diminishes by little and little, only by the Use of the usual Remedies, without the Assistance of Astringents, either taken inwardly, or apply'd externally by Injection; when there is no *Cordee*; when it does not fall into the *Scrotum*, when there is no Defluxion in the Joints or the Eyes; and lastly, when no Fever comes and stops the Running. When the contrary to any of these happens one may be assured that the Pox won't fail of discovering it self.

The *Shanker*, however well it may be cured, generally causes the Pox, especially if it grows hard, if there remains any Hardness after the Cicatrizing of the Ulcer, if the Prepuce continues swell'd, or in fine, if any Gland of the Groin remain hard or larger than it ought to be.

Amongst the great numbers of Patients afflicted with the Venereal Disease, that have been under my hands, I have found few that have had the Pox but have it one of these ways.

If the Clap and the Shanker may be attended with a Pox, it ought not to be doubted but the *Bubo* will also. The Distinction that is made of *Bubos* into primitive and consecutive is just, but the Inference that is drawn from thence is not so.

'Tis true the Primitive *Bubo* pre-supposes a Transportation of the *Virus* from the *Penis* to the Glands of the Groin, immediately by the Lymphatick Vessel of this Part; but it ought not therefore to be concluded that all the *Virus* is carry'd into those Glands.

1°. Because the Lymphatick Vessels which go to the Glands of the Groin, are not the only ones that carry back the *Lympha* from the *Virga*. There are some of these Vessels that go along under the *Urethra*, which discharge their *Lympha* in the Lymphatick Vessels of the *Hypogastrium*, which is an open road whereby the *Virns* may insinuate it self immediately into the Mass of the Blood.

2°. There are also other Lymphatick Ducts, which follow the *Vena-inhonestā interna*, which pass with it under the Arch of the *Os Pubis*, and also empty themselves into the Lymphatick Vessels of the *Hypogastrium*, both the one and the other of these Vessels may carry the *Virus* immediately into the Mass of the Blood.

3°. If all the *Virus* shou'd only take the Rout of the Lymphatick Vessels that go to the Glands of the Groin, Can one be certain that all this infected *Lympha* stops at those Glands? To make this possible there must be an Obstruction immediately after Coition, which must be total at the Beginning, otherwise some of the *Lympha* wou'd pass into the Blood,

Blood, and consequently the *Virus* along with it.

4^o. The Lymphatick Ducts are not the only Vessels capable of carrying the *Virus* into the Blood, the Veins may also do it, and 'tis known that this Passage being interrupted by any Glands, the *Virus* must immediately mix with the Blood.

The *Bubo* whereof I speak, is that which most Surgeons think exempt from the Pox when it suppurates; nevertheless it may be seen by what I have just said, that it ought not to be trusted.

The Consecutive *Bubo* pre-supposes that the *Virus* has pass'd immediately into the Mass of the Blood, and that afterwards it insinuated it self by Circulation into the Glands of the Groin by the Lymphatick Vessels: 'Tis agreed upon that this is Pocky, no Body disputes it; I must make here one Reflexion. If the *Virus* has got into the Mass, it proves that the Glands are no sure Barriers, since the *Virus* tho' (as it were) a Counterband can pass them. Wherefore if the *Virus* can insinuate it self in spite of the Glands, this proves that in the Primitive *Bubo* there may remain little or much, and therefore more or less of the *Virus* will infuse it self into the Blood; but because however little it may be it is sufficient to corrupt the whole Mass, it may be concluded that all *Bubos* are Pocky.

Thus the difference between a Primitive and a Consecutive *Bubo* is, that the Primitive comes a little after the Coition, and the Consecutive a good while after: The Primitive one is form'd at the first by the *Virus* that is carried immediately from the *Virga* to the Glands,

Glands, and the Consecutive by the *Virus*, which after having circulated in the Mass, has settled in the Glands either a little or a long time after; whence it sometimes appears a Week or Fortnight, a Month, a Year, or more after the Coition, as Experience shews daily. By what has been before said, the one does not differ essentially from the other: I can neither believe that in the Consecutive *Bubo* all the *Virus* passes into the Mass of Blood, without any Part's remaining in the Glands, nor that in the Primitive one, all the Infection stops at the Gland without any getting into the Blood; therefore the Difference between the one and the other, is only that more or less of the *Virus* has insinuated it self into the Mass, or is retain'd in the Glands, and that they require more or less Time to appear or be form'd in. Both the one and the other may make a slow or a swift progress, may suppurate, harden or disperse, may effect several Glands or one only, may seize upon the Groin, the Armpits or the Neck.

It must be observ'd that the Primitive one which has been got by Coition, always appears at the upper Glands of the Groin; that that which has been catch'd at the Breast either by having given suck to an infected Child, or otherwise breaks out at the Glands nearest the Arm-pits, and that that which is the consequence of lascivious kisses seizes upon the Glands the most contiguous to the Throat and Neck.

'Tis not the same with the Consecutive *Bubo*, it may affect all the same Glands indifferently, and therein one may confound it with

with the other; nevertheless there are Cases wherein one can't be mistaken.

If after an impure Coition a *Bubo* breaks out under the Armpit, it can't be deny'd but that this *Bubo* or Boil is Consecutive; likewise if a Nurse has one appears at the Neck or Groin after having given Suck, this *Bubo* is Consecutive also.

If, after having kiss'd an infected Woman lasciviously, a *Bubo* breaks out at the Armpit, or Groin, this *Bubo* likewise is Consecutive.

Wherefore any *Bubo* that seizes upon the Glands, that are distant from the Part which contracted the Infection, is a Consecutive *Bubo*; but every *Bubo* that affects the Glands contiguous to the Parts that have offended is not a Primitive one. It has been already proved that the Consecutive *Bubo*'s may seize upon the most adjacent Glands, but there are *Bubo*'s that break out in the same Neighbourhood that can only be look'd upon as Consecutive *Bubo*'s, altho' they appear immediately after the *Coitus*. For instance, if they come on the lower Glands of the Groin, 'tis known that the Lymphatick Vessels discharge themselves into the upper Glands, wherefore this *Bubo* must be Consecutive, because it can only have been form'd by the infected *Lympha* that is come back from the lower Extremities, and this *Lympha* cou'd not come back but that 'tis carry'd thither by the Laws of Circulation.

If a Nurse has a *Bubo* under the Arm, this *Bubo* is Consecutive for the same Reason, because the Lymphatick Vessels that come from the Breast discharge themselves into the upper Glands of the Armpit.

If, immediately after lascivious kisses, a *Bubo* breaks out near the Throat, it is not so easy to distinguish it, for the Mouth is of such extent that its Lymphatick Ducts pass by an infinite number of different Ways: Wherefore we see *Bubos* break out under the Chin, above and under the Angle of the Jaw, and along the Neck as far as the Clavicles: They have been known to seize upon the Glands *Thyroides*, and even the *Thymus*. All these *Bubos* may be either Primitive or Consecutive; one can't distinguish them by their Situation, because that (as has been observ'd) the Mouth being of great Extent, the *Lympha* returns by different Ways, and may immediately discharge it self into all the Neighbouring Glands. 'Tis true that all these various Passages unite themselves into two or three on each side, the chief whereof is the famous *Ductus toriferus* of *Bissius*, which empties it self into the *Subclavian* Vessels: Wherefore there are only the *Bubos* that come behind the Ears, or the Neck, and those of the Glands *Thyroides*, or of the *Thymus*, which can be affirm'd to be *Bubos* Consecutive of wanton and impure Kisses; because the *Lympha* of the Mouth does not pass by these Ways; but this is not sufficient ground for one to assert that the others are Primitive *Bubos*, for Reasons already mention'd.

'Tis very seldom necessary, 'tis even almost always needless, to distinguish these *Bubos*, the one from the other. I have already said that both the one and the other were Pocky, and tho' the Method of curing them may seem different to many, I am of Opinion that it ought in general to be the same; and if those who think the contrary shou'd

shou'd reflect that most part of those who have been under Cure for a good condition'd Pox, have been managed agreeably to that indulgent System; which only gives the Pox to those over whom that Disease exercises all its Fury; they wou'd say that many who have been so managed are in good Health. To this I answer two Things, first that we know several Persons who have never been under Cure, or at least who have been in very ill Hands, who in appearance enjoy a perfect Health, because the Pox gives Respite of 15, 20 and 30 Years, nay more. Secondly, who can assure us that those whom we have treated so indulgently, have not sought a Cure amongst others of our Fraternity, who, not being so easy, have administered effectual Remedies to them: We see them in good Health, and we believe our Palliatives to be the Cause of it, by reason they conceal what they have done without our Knowledge; wherefore I shall judge an *Exostosis* to be Venereal when the Patient has had a Clap, whether well or ill cured; because we have observ'd that a Man may get the Pox at the first, and that the Clap may be Consecutive, that is to say, a Symptom of the Pox: For in the same manner as the *Virus* of a Clap, whose running is suppress'd, may infect the Blood, this latter being infected may corrupt the *Prostate* and cause a Clap.

If an *Exostosis* follows after the Suppression of a *Gonorrhea* by Injection, I shall judge this *Exostosis* to be Pocky.

If during the running of a Clap a Fever comes and stops the running, the *Exostosis* which ensues will be Pocky.

If an *Exostosis* comes after a Clap that has been of long standing and difficult to Cure, it will be Veneral.

If the Clap falls into the *Scrotum*, the *Exostosis* is Pocky, the same may be said of the other Causes of the Suppression of a *Gonorrhea*.

The Shanker ought not to be less suspected, but rather more, since the Hopes of not having the Pox, on account of a Clap, is only founded upon the Copiousness of the Running that attends it; one ought the rather to apprehend the Pox after a Shanker, because this Ulcer suppurates less in a Month than a Clap in a Day; wherefore when an *Exostosis* seizes upon any one who has had Shankers, I shall make no scruple of judging it Pocky, because it has been observ'd that the Primitive, as well as the Consecutive, Shanker is the Pox.

I shall add no more concerning *Bubos*, I have said enough; I have even given an Insight into this Matter which I may venture to say, was but little known, and perhaps will be but ill relish'd; It is not my Fault, I speak what I think, and which is more, what I have always been confirm'd in by above 30 Years Practice.

Tho' I don't here treat fully of the Pox, I can't forbear saying something *en passant* of the Nature of the Pustles and Warts; leaving the other more common Symptoms till another Occasion; hoping one Day to publish the Observations whereon I ground the severe Judgment I pass upon all those that are affected with any Venereal Distemper whatsoever.

The Pustules and Warts are esteem'd by the whole World as certain Symptoms of the Pox, wherefore I shan't amuse my self in proving that they are the Pox it self. I shall only describe the Marks whereby to know them.

There are several kinds of Pocky Pustules, the one are dry, the other moist, and both the one and the other are flat or rais'd, irregular or round, painful or not.

The dry Pustules are also of several Sorts, some are like Tetters, some fiery, others Scurfy, Scaly and Scabby ; some are Yellow, others of a Red, inclining to a Purple.

The moist Pustules are apt to suppurate and to bleed, or run with reddish *Serum* ; some of these lie even with the Skin, others are corrosive and attended with deep Ulcerations, others again break out in Tumours, which render the Skin uneven and rough.

The round Pustules may be either humid or dry, but they are generally small, the largest being about the size of the Little Finger Nail : There are some less that rise up sharp, from the ends whereof there comes out a Drop of red *Lympe* imperceptibly. Some lie under, or in the Body of the Skin ; these appear generally immediately after the going in of a Shanker or a *Bubo*, and are taken by the Patients for what is commonly call'd an Ebullition of the Blood. They don't Ulcerate the Skin, but they make it speckled, and when they disperse, the *Epidermis* falls in Scales.

The irregular Pustules are only so, because several of them grow together in Clusters ; they may be of the same Quality with all those before-mention'd.

The Pustules that cause no Pain, are almost all those that come after the disappearing of the *Bubos*.

All those which suppurate or incline to Suppuration are painful; which proceeds from the Acid Quality of the *Pus* that is bred in, or runs from, them. Several of these Pustules rise up like little Boils and don't suppurate, but remain a long Time red and hard: Others suppurate like a Boil, and grow black as a Coal, and the Ulcer that attends them is deep and hard to Cure: One may see by all these sorts of Pustules, both painful and suppurating, that those who think that the Pustules which suppurate are not Pocky, are deceiv'd; neither is it upon their not being painful that one must rely, as some think.

It must also be observ'd that the Pustules gather to a head, or are painful, according as they are situated; those which are bred in the bending of the Thigh, between the Buttocks, on the *Scrotum*, under the *Virga*, at that Part which rests upon the *Scrotum*, under the Arm-pits, and behind the Ears, are both more painful on account of the friction of those Parts, and more suppurating by reason they touch mutually, and the one discharges its *Pus* or ferous Matter upon the other, which together with the Friction irritates, heats, and inflames them.

This is sufficient to give an Idea of the Pustules by their distinguishing Marks; I might say more, but I shou'd digress too much from my Subject; wherefore I shall finish in speaking one word about the Warts.

The Wart is so certain a Sign of the Pox, that we cannot be mistaken in it. It comes out
upon

upon the Thighs near the Groin, the *Anus*, the *Scrotum*, and the *Virga*; those which are on the Thighs, the *Scrotum*, and the Outside of the *Virga*, are usually only shaped like a Wart, but those in the Bend of the Thigh, or at the *Anus*, and those which come upon the *Glans*, or the Inside of the Prepuce, have different Forms.

In the Bend of the Thigh, and at the *Anus* they are sometimes long, high, and jagged like a Cock's Comb. Upon the *Glans* and on the Inside of the Prepuce, they are like flatted Raspberries. All these various Forms proceed from the pressure they suffer, which obliges them to frame themselves to the Parts, and hinders them from growing every way, as they do elsewhere where they are not constrain'd and nothing prevents their growth.

Pains in all the Limbs, Want of Sleep, Restlessness in the Legs, the Falling of the Hair of the Head and other Parts, Weariness, Leanness, Indigestion, a Vomiting, and Looseness, the Jaundice, Inflammations in the Eyes, the *Gutta Serena*, the *Cataract*, the *Fistula Lachrymalis*, in the *Perinaeum* and the *Anus*, those which come after certain Imposthumes; the Difficulty of hardening the *Callus* after a Fracture's being well reduced, and kept in its right position; all the Ulcers of the Nose, the Eye-lids, the Throat, the *Anus*, and the Lungs; in a Word all manner of Diseases may be caused by the Pox; and if few Persons are of the same Mind, 'tis by reason few of them observe: 'Tis Observation, I repeat it again, that makes us Surgeons; without that we may visit Patients, and have them under Cure, without knowing their

Distempers; which has made me often say that to see Patients, and see their Diseases, were very different things: They that are Ignorant see more of their Patients than of their Diseases, and those that are Skilful see more of the Diseases than of the Patients.

I conclude that all I have said concerning the Pox ought to be considered, when one is to decide whether an *Exostosis* be Venereal or no; and that 'tis an Ignorant Rashness to affirm that an *Exostosis* is not Pocky, when the Patient has been affected with any Venereal Distemper, however slight it might seem, and even if it were 30 or 40 Years ago, and the Patient had during all that time enjoyed the most perfect Health in the World. This Distemper has no Prescription, it appears and disappears, it causes a Symptom, which vanishes, and another succeeds; 'tis, as I before observ'd, a very *Proteus*.

Methinks I hear certain Persons criticise upon what I say; but till I can answer their Criticisms, let them examine whether they have seen a sufficient number of Venereal Distempers to judge of it; whether those whom they believe to be living Proofs against my Practice, are so much as they imagine, and whether what they think a radical Cure be not a Palliative. When I have finish'd this Treatise of the Diseases of the Bones, I will set about a Treatise of Venereal Diseases, wherein I will quote all the strongest Arguments that are against what I advance of this Distemper; and I will refute them by such convincing Reasons and Observations, that I shall only have Prepossession and prejudiced Persons

Persons against me, Knowledge, Experience and Honesty shall be my Judges.

Signs of Cancerous Exostoses.

'Tis here that a Man must be very attentive to what is past, that he may not be mistaken; there are hardly any *Pathognomonick* Signs known whereby to distinguish the Cancerous *Exostosis*; 'tis true, one may reason thus, the Patient who has the *Exostosis* has no Signs of the Scurvy nor of the King's-Evil; he has never run the Risk of getting the Pox, therefore his *Exostosis* is Cancerous. Besides his Swelling is of a dark Colour, it came by degrees, it was little and exactly circumscrib'd at its first appearance; in a word there are no other Signs that discover an *Exostosis* to be Cancerous, the Pain it self which is so certain a Sign of an Occult Cancer, is not more violent here. It may also be judged that an *Exostosis* is Cancerous when it does not yield to *Mercurial* Remedies: That of the Woman's, whereof I have made mention, whose Bones broke, was easier to judge of, because this Patient had the Cancer in her Breast; one cou'd not be mistaken, no more than in hers, whose Breast I took off and dissected after her Death.

Signs of a Scrophulous Exostosis.

When the Patient that has the *Exostosis* has had the *Struma* in his Youth, when he has Kernels gather'd in his Neck, under his Arm-pits, at the Groin, when his Body is bound, his Digestion bad, his Complexion pale and
a little

a little livid, when he has swellings in his Nose, or his upper Lip, when his Eyes are weak and water, when he has a pituitous running at the Nose; all this may make us suspect that his *Exostosis* is Scrophulous, especially if he has been ill nurs'd, in his Youth, if he lives in a Fenny Country, if he is a *Spaniard* or *Piemonese*, and if his Father, Mother or other Relations have been afflicted with this Distemper.

One is not mistaken in *Exostoses* that come after the Small Pox, the Disease is not long e're it appears, and the purulent Defluxions that seize upon the Parts near the Bone, foretell the approach of an *Exostosis* or *Caries*. These Defluxions come in a Days time, and the Fluctuation of the suppurated Matter is almost as sudden as the Tumour. I have open'd a great Number of these Abscesses, and I have almost always found the Bones bare, *Exostos'd*, or putrify'd. M. Barbeffon one of my Brethren sent for me to a Consultation for the Child of the Master of a Bagnio, for whom he had already lanc'd two Imposthumes, one at the Elbow and the other at the Knee: That at the Elbow cured pretty easily, and without any sensible Exfoliation, altho' the Bones were bare. The other at the Knee had laid open the *Rotula*, so that the bony Part of it was entirely separated from the Cartilages, Ligaments, and *Aponeuroses*, without the Cavity of the Articulation's having suffer'd by it: The Pus took its Course outwards, and the Cartilages that cover and surround the *Rotula* remaining whole and sound, the Joint was preserv'd. This Observation is very curious.

Prognostick.

The benign *Exostoses* are only curable by Manual Operation, which is not adviseable unless the Situation of the *Exostosis* is detrimental to some motion, as has been observ'd before.

The Scorbutick *Exostosis* is troublesome, the Pocky is less so, and the Ricketty often heals of it self; the Cancerous one is mortal unless the Limb can be cut off, and even then fatal accidents sometimes happen by reason of the Defluxion of the same Tumour on some Part: The Prognostick of the *Caries* is the same. I shall hereafter lay down some Aphorisms concerning this Disease, by the help whereof it will be better understood.

Of the Cure of the Exostosis, and Caries.

The benign *Exostosis* is only to be cured by Extirpation, but then it must incommode one very much in some of the Motions of the Body, before one ought to resolve on it. That of his Eminence the Cardinal *de Rohan*'s Domestick was only a little incommodious, it never hurt him in the least, but in putting on his Hat, nor wou'd not, if he wou'd have suffer'd that slight inconvenience; 'tis true the Way of rooting it out contributed a little to it. If I were obliged to perform such an Operation, I wou'd do as I had design'd then. I had been chosen to undertake this Tumour, and my Intention was to make a Circular Incision in the Teguments at the Basis of the *Exostosis*, to saw the Swelling to cut the Teguments Star-ways in Three or Four Places, and particu-
larly

larly the *Pericranium*, in order to loosen all the Stays, being convinced that when one don't take this precaution, it is upon the stretch, and will be inflam'd, which is follow'd by all the Symptoms, whereof this poor young Man died. Having thus cut the Teguments, I shou'd have apply'd the Fire, or used all the means to procure Exfoliation that shall be mention'd hereafter.

The Bony Wen of the Soldier's at *Lisle* was too large for any one to attempt to extirpate it. That which grew upon the *Condyle* of the *Femur* in the shape of a Stiletto might have been both hard and dangerous to have taken away; such Operations must not be attempted, but when one is forced to it by melancholy Symptoms.

The ricketty *Exostoses* and *Caries*, are cured by making use of the Remedies that are proper for the Rickets, whereof we shall take notice in the following Chapter.

The Pocky, Scorbutick, Scrophulous, and Cancerous *Exostoses* and *Caries* direct us to two Things, the one is to combat and destroy the internal Cause, and the other to encounter and subdue the local Imperfection.

The Internal Cause of Scorbutick *Exostoses* and *Caries* is to be remov'd by Diet, and by general and antiscorbutick Remedies.

The Internal Cause of the Pocky *Exostosis* is taken away by Mercurial Frictions, which procure a good condition'd Salvation; this is call'd the great Remedy, because it cures in a short time, easily and certainly. The preparations of *Mercury* that are taken at the Mouth are insufficient Remedies, always Pernicious, and the Sudorifick Ptisans are not more efficacious; what is most surprizing is that

that tho' certain Persons vend them under their Names, they find Bubbles to take them. The whole City is full of these Mountebanks, and the Numbers of Bills that one sees set up in all Parts, giving Notice where infallible Remedies may be had for all sorts of Distempers, would make the *Siamese* believe that People cou'd not die in *Paris*: Nay they wou'd have reason to ask of what use the Physicians, Surgeons and Apothecaries are.

I shou'd be very desirous of knowing in whose hands they would trust themselves if they were Sick; if I may presume, these *Siamese* would judge more reasonably than most of our *French*.

To Cure therefore the Pocky *Exostosis* and *Caries*, one must cure the Pox; which is not what I pretend to in this Treatise, that is not my Subject: I shall only shew the manner of destroying the local Imperfection by the different Methods of Operating in one and the other Distemper; and to the end that young Surgeons may be fully instructed in all the Operations, I will, as much as possible, take different Examples.

As for the *Exostosis* that is only Scrophulous, it is hard to destroy the Internal Cause. The Difficulty is not so great when the Pox is the first Cause, nor even when the *Virus* follows the King's Evil. I shall not speak here of the Remedies that take away the Internal Causes, the Local-vice, which is the *Exostosis* or the *Caries*, must take up all my attention. As to the Cancerous *Virus* I would not do the same; if I knew any Remedy that would either mitigate or destroy it, as it cou'd not be known too soon, I would not wait till I publish'd a new Treatise before

I discover'd it. I confess, together with all Skillful Persons, that this *Virus* is incurable, and I believe, as well as they, that none but Quacks and Impostors will propose it. Let us leave these wretched and abominable Parasites, and let us teach young Students how to exercise our Profession with Skill, Judgment, and Dexterity.

Of the Cure of the Local Vice of the Exostosis and Caries.

One ought not to undertake *Exostoses* but when they Suppurate, or when, after having cured the Internal Cause, they continue as large as ever.

When the *Exostosis* has suppurated, one must open quite to the place where the *Pus* resides; it will either be found that it has seiz'd upon the soft Parts only, and that the Bone is cover'd with good Flesh; or else it will have exfoliated, and the Bone will be cover'd with good Flesh; but for the most part the Bone is found to be bare, rotten, and Wormeaten, and sometimes penetrated to the very Marrow.

If 'tis found that the *Pus* has only seiz'd on the soft Parts, and that the Bone be cover'd with good Flesh, 'tis sufficient to give it a free Vent by a large Opening, and to manage this Distemper like lancing of a simple Imposthume.

Observe nevertheless that altho' the Flesh may seem good, it is not always so; but a little Time will instruct one how to know it. It must be of a good Grain and firm, must grow no more than is necessary, and its growth

growth must not be too sudden. It must be sensible, but yet so as to bear touching, must not bleed, and must be of a rosy red. On the contrary if the Flesh that is over the Bone be smooth, or full of fungous excrescencies, or if it be soft and grows too fast, if it be painful or insensible, if it bleed, be white, of a lead colour, an angry red, or a deep or black red, that shews that the Flesh is bad, and the Bone diseas'd. In this Case one must treat the Ulcer, not like the lancing of a Simple Abscess, but like an Ulcer with a *Caries*, whereof mention shall be made in the Sequel.

Tho' the Flesh may not be in this last Condition, and even tho' it may seem sound, it happens in the Course of dressing that it becomes fungous; then Care must be taken to correct it with Powder of Allum calcin'd with red Precipitate, Lime-Water, or *Phagedænick*-Water: The solution of *Mercury* with *Aquafortis*, or Spirit of Nitre is very good; one may render it more or less weak, by mixing with it a little Simple, or Vulnerary Water. The brown Ointment which is nothing but *Basilicum* and Precipitate mix'd together is excellent, and may be made more or less strong. Green Balsams in the Composition, whereof Brass is an ingredient, as the Balsam de *Féuillet*, Verdigrease, and *Ægyptiacum* are very useful. Nor must one forget the Balsam of Steel, made with Filings dissolv'd by Spirit of Nitre, and mix'd with Spirit of Turpentine. 'Tis very efficacious for correcting the Flesh, and even afterwards because it may be lower'd by mixing thereunto *Unguentum Hypericum*, or *Terebenthinum*. This must

must be done till the Flesh be grown even with the Skin, and when it gets above it, one must Cauterize it with *Lapis infernalis*, till the Ulcer be consolidated.

The *Exostosis* being open'd, when the Exfoliation is perfect, it must be extracted from the Ulcer, and examine the Flesh in order to heal it as in the two foregoing Cases. But if the Exfoliation is not total, one must procure it by all the means that will be proposed hereafter.

If, after lancing a suppurated *Exostosis*, the Bone is only bare or else rotten, Worm-eaten, or pierc'd to the Marrow, one must observe what follows.

If 'tis only bare, or has what they call a dry *Caries*, or Simple Alteration, one need only lay over it a Pledgit of Lint steep'd in Brandy or Spirit of Wine: The Wound may be fill'd up with dry Lint, and the whole be cover'd with Pledgits, after which the rest of the Dressings may be put on.

At the first Dressing the Bone must be examin'd, it may be dress'd in a Pledgit dipt in Spirit of Wine, and the brown Ointment may be apply'd to the Flesh. But if the Bone be long in Exfoliating one must make use of the Medicines proper to hasten the Exfoliation.

In the *Caries* of the Bones, whilst one is combating the internal Cause with the general Remedies and Specificks, one must go to work upon the rotten Place, so as to procure the *Exfoliation*, that is to say, the separating of the unsound Part from the sound. This separation is without dispute one of the Acts wherein Nature not only exerts her Power, but wherein she conceals her ways of working, as much as in other Instances. However

ver if I may be permitted to relate what I have observ'd, in following her with great attention, I shall say that I have always remark'd that when the Bone don't sweat out any Moisture, but is dry, the Exfoliation is made sooner then when a serous Matter distills from it; which has made me imagine that the Exfoliation is never quick in communication with the Vessels of the sound one. This intercourse being cut off induces me to believe that the Juices which run in the Vessels of the sound Part make an Effort against the Part that is impaired, and that these Efforts being redoubled by the Resistance, and reiterated every Moment of Life, are the Cause of the insensible separation of the corrupt part of the Bone.

I perceive in a little while, about the Circumference of the rotten Piece, some new Flesh that grows more and more; and I have reason to believe that in proportion as the first Efforts of the Juices cause the separation, these nutritive Juices congeal and turn to Flesh, and that 'tis the insensible growth of this Flesh which infallibly finishes the separation of the Diseas'd Bone, and forces it away. I am the more sure that Nature acts thus, in that I find this Flesh of a good grain at the place, where the separated Piece of Bone was, and because this Flesh assures me by its good Quality that the Bone which remains underneath is sound.

I don't pass the same Judgment on the *Caries*, when some matter sweats thro' the porous Parts of the Bone. On the contrary, I say, that since the Juices find means to escape, and the corrupted Bone is no Obstacle to their Passage, they make no Effort against

it, and will not separate so soon. This Observation will help us to give a Reason for the manner of the Working of certain Remedies that cause the Bones to exfoliate speedily.

Before I proceed any farther I will not let slip two Observations that I have made upon the sweating of the Matter thro' the porous Parts of Bones that are bare. The first is that when this sweating is serous, the *Caries* often degenerates into a Worm-eating; and the second is, that when 'tis bloody, there grows Flesh in the intervals of the Rotten Bone, which produces a *Caries* of a particular kind; the Flesh, tho' soft, seems firm, because 'tis nestled between the Fibres of the Bone which supports it; by laying a Finger upon the Flesh, one may feel little bony Inequalities that go a-cross and sustain it.

If then the *Caries* is dry, and there is no sweating, it must be dressed simply, as we have shewn above, especially if 'tis superficial; but if 'tis deep, or if, tho' superficial, it will not exfoliate, or if it sweats a bloody or a serous Matter, the solution of Mercury in *Aqua fortis*, or in Spirit of Nitre, may be apply'd successfully; and this Application must be repeated more or less accordingly as the *Caries* appears to be more or less deep. One must dress it with dry Lint on the Day of applying the Remedy, and with Lint steep'd in Spirit of Wine the Day that it is not apply'd.

When the sweating is attended with Worm-holes, or when one would prevent it, if the Solution of Mercury is not sufficient, recourse must be had to the actual Caustery, after the manner that shall be mention'd hereafter.

If

If the Sweating is attended with an Excre-
 scence of the Flesh, as has been before said,
 one must not only use the Actual Caution, but
 a *Raspatorium* or *Scalpum*, to raise up the Flesh
 and scrape the Bone, to the End that the
 Fire may penetrate and eat away both the
 one and the other with the more Ease.

The *Caries* that is accompany'd with Worm-
 eating of the Bone is not always easy to
 cope with; I don't mean that the internal
 Cause is hard to take away, all the World
 is convinced of that, but I mean the Local-
 Vice. And indeed 'tis often that in a *Caries*
 of this sort, which has been neglected, almost
 the whole body of the Bone is Worm-eaten;
 neither is this of such fatal Consequence when
 it happens to Bones that don't serve as Props
 and Supports to the Body; but if this Dis-
 ease attacks the Bones of the Thigh or Leg,
 Arm or Fore-Arm, one may judge it very
 fatal, for the Bone may be broken entirely,
 and then the Limb will have no support.
 For this Reason the Part must be sustain'd
 with Tin Plates, Past-boards, Cases, or other
 Machines, whilst the necessary Operations
 are performing; which are to scale the Bone,
 and afterwards to burn it with the Actual
 Caution, being careful always to have a *Scal-
 pum* that cuts well, so as that one need not
 lean hard upon the Bone, for that might
 break it. For the same Reason the Actual
 Caution, which is an Iron, must be as red hot
 as possible, that it may burn tho' laid on but
 lightly.

For the right Application of these one must
 have several Cautiones of the same Size and
 Figure, which must all be put a heating in
 fiery Coals, whilst the Surgeon opens the

Wound, wipes it, and turns it with wet Linnen to preserve it from the Fire. One must begin to burn at the middle of the *Caries*, and continue by the sides, to prevent the Heat's annoying them. The Cauteries that are apply'd to the middle may be clapt on one after another, but some distance must be left between the applying of those to the sides of the *Caries*, that the wet Linnen may have time to cool; one may even wet the Cloth again to cool them the more speedily, but must take care to squeeze the Water well out that it mayn't run out, for that would cool the Cauteries.

This Application being made, the *Caries* must be dress'd with dry Lint; it may be steep'd in Spirit of Wine, if the Patient was very sensible of the Heat, as it happens sometimes on applying the Cauteries to Bones that have Marrow, the rest of the Ulcer spreads as usual.

The actual Cauteries must not be apply'd at once, 'tis better to lay them at several Times upon the Part affected, because otherwise the Heat might penetrate deeper then it shou'd. One may judge of the necessity of burning more or less by the apparent thickness of the *Caries*, or by its *Species*.

That which is attended with Worm-eating or a *Hypersarcosis* requires a stronger application than the others, for in the one 'tis necessary to destroy the bad Flesh, to affect which one must burn quite to the sound Parts, whence the Vessels come that feed the Flesh; and in the other one must dry up those whence the serous Matter issues. The Fire must also be apply'd with more Force to the Spongi-
ous

ous Bones when they are attack'd with these two sorts of *Caries*.

When the *Caries* has Communication with the Channel of the Marrow, one is obliged to trepan the Bone. They sometimes trepan the *Sternum* to discharge the *Pus* that is under it, and runs out at a little Hole of the *Caries*. The *Caries* of the Marrow is sometimes the Consequence of Abscesses that are bred there; and these Abscesses proceed from Blows that have caus'd a Commotion in the Marrow, as they are known to do in the Brain. At other Times the Imposthumes are produced by the Corruption of a Part of the Bone, which exfoliates quite thro' to the Channel of the Marrow; and when the exfoliated Piece is not taken out, it hurts the Marrow, and annoys the good Flesh that has separated it; and as this Flesh grows over it, it hardens and inchasfes this Piece of Bone (to use that Expression) so that 'tis impossible to extract it without a great loss of the substance of the Bone by applying two or three Crowns of the Trepan.

It often happens that the *Exostoses* cause these Abscesses, when they stick out towards the Channel of the Marrow, compress its Vessels, and interrupt the Course of the Juices. The *Exostoses* of this Kind are preceeded by great Pains which the Patients feel in the Heart of the Bone, and when they suppurate they break sometimes towards the Marrow instead of breaking outwardly.

I had a Man under Cure for the Pox, who had such an Abscess in the middle of the *Tibia*; he had a kindly Salivation, and his Swelling in his Leg, which was but small, disappear'd, tho' the Pains did not entirely

cease. They increas'd a Fortnight after his leaving my House; he came to see me, and I found him a little Feverish, and his Leg was become red and Painful outwardly. Mr. *Castes* and Mr. *Robordeau*, who had been Witnesses to part of his Treatment were call'd to a Consultation, and I gave them an Account of what they had not seen; they agreed that he had been regularly managed, and that for the present some Blood should be taken from him, and the Part should be fomented and pump'd with hot Water and Brandy; that for the rest the Tumour being gone, the place where it had been should be laid open, that being the Part where he felt most Pain, believing that all these Accidents might be caused by some matter which might be got within the *Periosteum*.

I open'd it, but the Patient found no Relief, and two Days afterwards it was resolv'd to apply the *Trepan*, which was painful enough, but discover'd to us the Cause of these Pains, by the considerable Discharge of a very stinking *Pus*.

The Marrow was quite dissolv'd and the Channel seeming almost empty, caused me to apply three Crowns more, and to cut the Spaces that remain'd between the one and the other. The Actual Caustery was apply'd, the Exfoliation made, and the Patient cured. The late Messieurs *Ledran*, *Arnaud*, and my self were sent for to a Young Girl of *Provence*, on whom we perform'd the same Operation, with equal Success.

It may be observ'd, *en passant*, that if a great deal more *Pus* comes from most part of the Ulcers, wherein the whole extent of the *Caries* is not discover'd, than the bigness of the Ulcer
ought

ought seemingly to breed, 'tis because there is a Hole in the *Caries* that has Communication with the Channel of the Marrow; and if one does not lay open the Bone to Trepan it, the *Pus*, which always stagnates, causes the Patient's Death: I have often perform'd this Operation, and almost always with Success.

I shall finish the Cure of *Exostoses*, by saying one Word of the manner of encountering the *Exostoses*, which will not disperse upon the curing of the Pox, or any other internal Cause.

The Tumour of the Bone must be laid open, by making a large crucial Incision; one must cut away part of the Angles, and dress it dry in order to take off the Dressings the next Day, and make use of the boring Trepan, wherewith several pretty deep holes must be made pretty near one another, being careful that they fill up the whole space of the Swelling that is to be cut away. After this one must make use of a Chisel, or Googe, that is very sharp, and a leaden Mallet, wherewith one strikes moderately to cut off all that has been bored by the Trepan. These Holes weakening the Bone, it is the more easily cut, without running any Risque of splitting it with the Chissel. 'Tis a way the Joyners use, to prevent their Wood from splitting when they work upon it. If the Swelling be considerable, one must repeat the Strokes of the Chissel and Mallet, the rest of the Operation should be defer'd till the next Day, because the reiterated Strokes may jar the Marrow, and in the end cause an Abscess. When all is taken away, the Bone must be dress'd, as has been said, and to procure a quick Exfoliation one may apply the Solution of Mercury by

Aqua fortis, or by Spirit of Nitre. 'Tis one of the best Remedies that can be used, and I don't prefer even the Fire to it, but when the *Caries* is deep, or attended with Worm-holes, or a fleshy Excrecence.

To end this Discourse of the *Exostosis* and *Caries*, I have compos'd some Aphorisms, which are only the product of my Observations, and daily Practice.

APHORISM I.

If the Exostosis don't appear, after the Use of the Remedies that ought to take away the internal Cause, one must attack the Local Vice.

We have taken notice of this Observation in the Cure, and it must be observ'd punctually, unless one discovers some Fault in the manner of administering these internal Remedies.

APHORISM II.

We have said that the Exostosis terminates in Solution, Induration, and Suppuration; one might add Rottenness, when the Bone is Worm-eaten, and Delitescence. Since we have seen several Exostoses vanish without the Application of any Remedies.

APHORISM III.

The Exostosis that terminates by Solution, is the most perfect, provided proper Remedies are used, the Reason is easily conceiv'd.

APHORISM. IV.

A Fit of an Ague sometimes causes the Exostosis to disappear: Perhaps it may be the disappearing of

of the Exostosis that produces the Ague, by the Virus again entring into the Blood.

APHORISM V.

When the Exostosis vanishes without having made use of any Remedies, it is generally follow'd by other Symptoms. It may be seen disappear in one place, and break out in another. This requires no Explanation, the Cause is easily comprehended.

APHORISM VI.

One may be morally assured that the Pocky Exostosis is cured, when it goes away after the using of Frictions, and a kindly Salivation.

APHORISM VII.

Altho' a Pocky Exostosis shou'd not entirely disappear after a regular Cure, one must not believe that the Patient still has the Pox. Because the Exostosis always leaves some mark, especially if 'tis of long standing, the bony Fibres not returning again to their Pristine State so easily as the Fleshy ones.

APHORISM VIII.

When the Exostosis is painful 'tis a sign it grows. When the Skin that covers it is red and painful, 'tis a sign of Suppuration.

APHORISM IX.

When the Tumour softens, and the Pain and redness abates, 'tis a sign the Exostosis is Suppurated: And upon mature examination one shall perceive a Fluctuation.

A P H O-

APHORISM X.

In the Exostosis where the Flesh opens of it self, the Opening will be Fistulous; the Bone being uncover'd sweats a reddish and very noisom Sanies.

APHORISM XI.

If a bloody and thick Pus issues out, if any Part of the Bone separates, and comes out at the Opening, the Ulcer will heal without a Fistula.

This often happens in the Pocky Exostosis which suppurates, breaks, and exfoliates naturally, without any Operation, if it has been encounter'd with Mercurial Frictions.

APHORISM XII.

The Exostoses that suppurate generally cause sharp and continual Pains, which must not be confounded with those that are caused by the Elevation and Divulsions of the Periosteum during the growth of the Exostosis.

APHORISM XIII.

In Ulcers, when the Bone is cover'd with Flesh that is spongiuous, soft, pale, or of a Mulberry red, 'tis a sign the Bone is corrupted.

APHORISM XIV.

If the Probe pierces easily thro' the Flesh to the Bones, if it bleeds with ease and without Pain, the Bone is putrify'd.

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APHORISM XV.

If on examining with the Probe the Bone is found rough and uneven, 'tis impaired; unless it be a natural unevenness, which Anatomy teaches us to distinguish.

APHORISM XVI.

If after having pierced the Flesh with the Probe, one feels at the end of it as if it touch'd rotten Wood, or wet Past-board, the Bone is rotten, and the rottenness will turn to a Worm-eating.

APHORISM XVII.

When the Plaisters are blacken'd by the Matter, the Bone is corrupted.

If there be any Lead in the Composition of the Plaister, this sign is equivocal, but it always shews that the Sanies is of the Nature of Aqua fortis, since it dissolves the Lead.

APHORISM XVIII.

If the Skin about the Ulcer is of a Violet or Lead Colour, the Bone is corrupted.

APHORISM XIX.

If the Sanies be serous, stinking, and in greater Quantity than ought to be for the bigness of the Ulcer, 'tis a sign of the Bones being corrupted or rotten.

A P H O-

APHORISM XX.

The Scar that is upon the impair'd Bone is soft, high, and without Adhesion.

APHORISM XXI.

The Scar that comes over the Sound Bone after Exfoliation must be deep and firm, cleave close to the Bone, and be white.

It is deep because Part of the Bone being exfoliated, there is a loss of Substance, and the Vessels which supply the Juices are shrunk, because they have been long exposed to the Air, to the Influence of drying Medicines, and to the Compression of the Tents where-with the Ulcer has been long kept open.

The Scar is firm, because it rests upon the Bone, and because part of the bony Juices contributed to the making it.

It cleaves close, because the Bone and the Flesh have form'd out one and the same Scar.

It is white because the Pores are very close, and reflect a greater Quantity of Light.

APHORISM XXII.

When the Ulcers near the Bones are of a Year or more standing, the Bones rot.

The Caries seizes on the Bones that are near old Ulcers, because 'tis impossible during that Time the Matter of the Ulcer, and the Oedema it causes in the Parts adjoining, shou'd not change the natural Disposition of the Periosteum, which occasions the Obstruction of the Vessels that pass thro' the Bone, whence follows the Stoppage, Acidity, and Effusion of the

the Juices, and the Destruction of the bony Fibres.

APHORISM XXIII.

When the Patient complains of having suffer'd Acute and great Pains in the Beginning of the Imposthume that brought the Ulcer, one ought to suspect a Caries, or a Disposition thereunto.

This Pain shews that the *Periosteum* has suffer'd, and that the Bone may have been a therein sharer for the Reason above mention'd.

APHORISM XXIV.

The Bones may be impair'd without the Flesh's being spoil'd; because they are nourish'd by the Lympha, and this Liquor is generally the Vehicle of the Virus, of whatever nature it be, the rather because the Virus is Salt, as has been observ'd elsewhere.

APHORISM XXV.

The Ulcers of the Articulations, the Corner of the Eye, the Mouth, and Nose, are more frequently attended with a Caries than the Ulcers of other Parts of the Body. This proceeds from these Organs being more full of Lymphatick Vessels, and the Lympha that Waters them is the Vehicle of the Pocky, Scorbutick, and Scrophulous Salts.

APHORISM XXVI.

All the Bones that are separated from their Periosteum don't exfoliate.

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This is only to be understood of those Bones that have lost their *Periosteum* by Blows, Falls, or benign Imposthumes. The Vessels in the inside of the Bone always carry the Juices outwards, because they have Communication with those that are broken; and the Nutritive Juice stops there, and forms the little fleshy Buds which one sees rise insensibly upon the surface of the Bone, then unite together, and in the End cover the whole surface of the naked Bone.

APHORISM XXVII.

Bones that are laid open by external Blows, exfoliate more readily than those that are corrupted by Imposthumes or other Defluxions. Because the Caries that attends the latter is fed by an internal Cause. Now to the end that the good Flesh, which produces the Exfoliation, may grow, and force away the infected Bone, there must be no vicious Quality in the Juices that breed it. Therefore, &c.

APHORISM XXVIII.

The deep Caries exfoliates with greater Difficulty than the Superficial one.

The Reason is that their Cause is generally malignant: Besides the Piece of Bone is thicker, and much harder, for the good Flesh that grows under it, to separate.

APHORISM XXIX.

When the Bone is ready to exfoliate, the Patient is in Pain if one touches it with the Probe, and sometimes the Ulcer bleeds.

The

This Pain proceeds from the Surface of the Bone, it being always rough and uneven on the side that separates; and if one thrusts it with the Probe, one also thrusts its sharp ends and uneven Parts against the good Flesh that is under it, which causes the Pain; and as these same sharp ends and uneven Parts don't fail to tear some Blood-Vessels, one may then perceive the Ulcer all bloody.

APHORISM XXX.

One must not move or endeavour to separate the Piece of Bone too soon.

Because that if the Separation be not yet advanced enough, one may break the little Pieces that still adhere to the sound Bone, which may renew the Ulcer, or prolong the Cure.

APHORISM XXXI.

Nevertheless one must move the Bone that is ready to fall off. This must be done gently for fear of breaking the little Parts of the Bone that are not loosen'd; for if one don't move it, nor endeavour to draw it out in due time, the Flesh that is bred by the sound Bone grows over, inchafes and keeps it in, whence there often proceeds fistulous Ulcers, the consequences whereof are sometimes mortal.

C H A P. XVII.

Of the Rhachitis, or Rickets.

TH E *Rhachitis* is a Disease almost peculiar to Children; and 'tis generally observ'd that those who are affected with it, have a livelier and more penetrating Wit than others. The Organs of their Senses are well disposed, their Face is full and well thriven, their Head large, and their Complexion ruddy. They eat much and with a good Appetite; their Liver and Spleen are of a considerable size. Their Colour and Consistence is natural, and their Heart seems sound, whilst in other Parts these poor Children have a thousand Disorders which render them Objects of Surprize and Pity.

They are lean, dry'd up, and as it were Skeletons in all the other Parts of their Bodies. The Back-bone grows crooked, their Joints are relax'd, their Bones become soft, and their *Epiphyses*, and almost all the Spongy Bones, grow knotty. Their Sutures are open, the *Fontanella* is Membranous, the Ribs are depress'd, the *Ossa Illia*, and the *Omoplata* are thick, shrunk, and, as it were, bent back. The great Bones grow crooked, which renders all the Limbs deformed. And, in fine, when one opens those that die of the Rickets, one finds that the Lungs, which cleave to the *Pleura*, are, Livid, Schirrous, and full of Abscesses, and that almost all the conglobated Glands, are swell'd with a thick *Lympha*.

Of the Causes of the Rickets.

All Distempers have but two sorts of Causes, the one is in our selves, and the other is external. Those which are in us ought only to be considered as second Causes, or, to speak more properly, as the Effects of the external ones. And indeed, the vicious qualities of the Spirits, the Blood, and other Fluids, which we look upon as internal Causes, are but the Effects of the vicious quality of the Air, the Intemperature of the Seasons, the Excess or ill quality of our Diet, hard working, extreme Idleness, long Sleeps or over Watchings, and very often of the not governing our Passions.

This being the Case, we ought to impute the Causes of all our Distempers to the Abuse of some of those things which the Ancients call'd the *Non-naturals*.

In order to compass the Design which I have propos'd to my self, I say,

1°. That this Abuse corrupts the Humours.

2°. That the Humours being corrupted after a certain manner occasion the Softness of the Bones.

3°. That this softness hinders the regular distribution of the Spirits in certain Parts, by the Disorder it produces in the *Spine*.

4°. That the Animal Spirits being interrupted in their distribution, cause the Leanness of the Soft Part, where the Nerves that are their Vehicles terminate.

5°. That the Softness of the Bones, and the Compression of the Nerves are the Oc-

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casional

caſional Cauſes of their Crookedneſs, and all the other *Phænomena*.

I begin by enquiring into the Primitive Cauſes of the vicious qualities of the Humours; and in Children, I find particularly Five, *viz.* The different Regions and Climates, the Teeth, when they are about cutting, or do actually cut, the Worms to which they are ſubject, the Ill quality of their Milk and other Aliments, and the Change of their Diet when wean'd.

The Climates have a great ſhare in the vice of the Humours that cauſes the Rickets, ſince we ſee that that Diſeaſe only happens particularly in *France, Flanders, Holland, and England*: Undoubtedly becauſe the Air there is leſs impregnated with Saline, Volatil, and Sulphurous Particles, than in the other Regions of *Europe*, and becauſe theſe Principles are eſſential to the Hardneſs of the Bones as ſhall be obſerv'd.

When the Teeth begin to cut, Children are in danger of becoming Ricketty, on account of the Pain they feel, which may be occaſion'd by two principal Cauſes. The one is in the Tooth, which has ſeveral little ſharp Ends that are like ſo many Needles, which, piercing and tearing the Nervous Fibres of the Gums, cauſe very acute Pains. The other is in the Gums, when they are hard, becauſe they reſiſt the more againſt the Efforts of the Teeth in cutting, whence the Nervous Fibres that compoſe them are the more rudely ſhaken, which renders the Pain more Acute.

This Pain may cauſe the Rickets two ways;

1^o. By reaſon it occaſions Crying, a Fever, want of Sleep, and Convulſions; which are
Acci-

Accidents so fatal to Children, that nothing is more apt to disturb the Chylification, weaken the Body, corrupt the Humours, and prevent their regular Distribution.

2°. The Gums being inflam'd, by the Teeth irritating them, make the Children often move their Jaws, to press their Gums against each other, without doubt to mitigate their Pain; since one sees that those pretty Innocents are eased when one rubs the Gums of those Teeth gently with ones Fingers, and 'tis observ'd that they stay a considerable Time at the Breast, not so much to Suck, as to nibble at the Nipple, and rub it against their tender Gums.

In short they carry every thing indifferently to their Mouths to ease themselves; and the repeated motion of their Jaws compressing the Salival Glands, causes the Saliva to run in a great quantity into their Mouths, and thence into their Stomach and Intestines, where it produces a Looseness, which, being joined to the Accidents that proceed from the Pain only, reduce the Children to a miserable Condition.

The Worms occasion such great Disorders, that the Children who have them have but broken slumbers; they press their Jaws hard against each other in their Sleep, they feel convulsive Motions in their Extremities, with violent gripings that cease some time after having eaten; they often rub their Noses, because they itch; their Bellies are swell'd, their Complexion is sometimes red, sometimes pale, they become pale, have a devouring Appetite, a dry Cough, and their Mouth is always full of Spittle.

Causes
of the
broken
slumbers.

They have but broken slumbers, because, the Worms are every Minute irritating the Membranes of the Intestines, and cause a reflux of Spirits that agitate them, as shall be explain'd hereafter.

Whence
the Gripes

The corrosive Gripes proceed from three Causes;

1^o. From the motions of the Worms against the Coats of the Intestines, which does with respect to them (but much more effectually) what a Feather or Straw does with respect to the Lips when drawn to and fro over them.

2^o. From the prickings they occasion by their biting or pinching, with their Teeth; since one sees that Worms eat into Planks and Stones: Even the Fruits themselves with their Stones and Kernels, Nuts, Filbreds, and Walnuts are pierced by them.

3^o. The Impression of the Verminous Matter upon the Coats of the same Intestines, is capable of causing these Gripes by the *Oxyglycon* that is contain'd in it.

'Tis from the Influence of these Vermin upon the Membranes of the Intestines, and that of the Verminous Matter upon the same Membranes, as also from the Introduction of this *Oxyglycon* into the Mass of Blood, that I shall derive the Explication of the other *Phænomena*.

The Startings happen thro' the Concussion and painful sensation of the Nerves, that cause a Reflux of the Animal Spirit, which being violently forced back into other Nerves, produce these Startings, and even the Convulsions in the Muscles where these Nerves terminate. Wherefore if this Reflux happens in the Nerves of the Arms, there will be convulsive

vulsive Motions and startings in the Arm: Mechanism that if in the Optick Nerves, the Eyes will be in produces the Convulsive Motions. Convulsions; if it falls upon those of the Lips it will cause a sort of Sardonical laughter; and infine if the Nerves which have communication with the Muscles that move the Jaws are affected with it, this Reflux will be attended with a grating of the Teeth.

It must be observ'd that not only these Convulsions, Startings and Convulsive Motions, are caused by the *Oxyglycon* before-mention'd, which, being got into the Mass of Blood, acts upon the Nervous Membranes, and there causes Irritations which are attended with all these Accidents, but also that having insinuated it self into the Blood, it may filtrate thro' certain Vessels, where it causes different *Phænomena*; for if 'tis carry'd to the Glands of the Lungs, it causes a dry Cough, by its irritating the Vessels of the Lungs.

If the Complexion of these Children is sometimes Red, sometimes Pale, it may be observ'd that it is Red when they Cough, because the Contraction of the Breast and the Muscles of the *Abdomen* compress the Lungs, whence the Blood is stop'd for a Moment in the Vessels of the Face and the *Subclavians*. On the contrary the Complexion becomes Pale when the Cough is over, because the Blood that was stop'd in the Face resumes its Course thro' the *Jugulars* and *Subclavians*. Different Colours of the Complexion.

Their Mouths are moisten'd with Spittle, because the *Oxyglycon* irritates the Salival Glands, and obliges them to discharge themselves more copiously into the Mouth. Besides the Muscles of the Jaws, the Lips, and other Parts adjacent, that are in a Convulsive

Ricketty Children have their Mouths always moist.

Motion, compress these Glands more frequently, which occasions the Discharge of that Liquor which is seen to flow out of their Mouths.

They
often rub
their
Noses.

They rub their Noses, because they feel an Itching therein, which proceeds from the *Oxyglycon* that has insinuated it self therein with the *Mucus*, and irritates the pituitary Membrane; and the Breath that passes thro' the Nostrils being impregnated with this *Oxyglycon* which it has deriv'd from the Vessels of the Lungs, must also irritate the Membrane of the Nose.

Shou'd it be objected that the Cause which (I take for granted, and affirm) acts upon this internal Membrane, can never excite the itching on the outside at the Tip of the Nose, I shou'd answer that 'tis a Sensation which the Soul carries to that place (altho' it perhaps may not be there) as it does on divers other occasions which shall not be examin'd into here. In a word, it is certain that this *Oxyglycon* insinuates it self into the Blood, since it discovers it self in the Spittle and Breath of Verminous Infants, as may be observ'd by the strong smell that exhales from their Mouth and Nose.

The Eyes
look dim.

The Convulsions in the Eyes are often attended with a certain Disposition which 'tis hard to describe, but which nevertheless is remarkable, the Eyes being as it were wild, dim, and in a word verminous. This proceeds from part of the *Oxyglycon*'s having penetrated into the *Lympha Lachrymalis*, irritated the *Palpebrae*, and caus'd an Itching therein: And as the Lachrymal Gland thro' which this Acid filtrates is near the *Musculus Levator* of the Eye-

Eye-lids, this Muscle being irritated contracts it self and draws the Eye-lid upwards.

The dimness of the Eye may be accounted for the same way, for this Acid being mix'd with the Aqueous Humour, causes a slight Coagulation therein, that renders it less transparent.

The Fever which attends this Distemper, and the irregular Paroxysms that are observ'd therein, are produced by the same Cause; by reason sometimes more, sometimes less of this Acid gets into the Mass of Blood, which makes it ferment more or less. Thus one may account for the irregular Fevers and other Accidents that afflict Children subject to Worms. In short it may be supposed that so many Accidents must hinder the Digestion and the Chylification, whence ensues Blood of an ill Quality, and a viciousness in the *Lympha* and other Humours, which prove the Cause of the Rickets, and an Infinite number of other Distempers.

If a Child has suck'd a ferous Milk, without Substance or Consistence, as often happens in Nurses that work hard and fatigue themselves, or in such as fare hardly, have any Disease, or continue to Suckle after being with Child, if, I say, a Child has suck'd this Milk without Consistence, its Blood will be clogg'd with an insipid *Lympha*, destitute of Volatil and Sulphurous Salts, which far from hardening the Bones will render them the softer, since their natural Solidity depends upon the imbibing of Saline and Sulphurous Principles which are not to be found in this *Lympha*.

If Children are deprived of the use of good Milk, before they have most part of their
H h 4 Teeth,

Teeth, not being able to chew, they often fall into a Consumption or *Rhachitis*; because the *Menstruum* of their Stomach is not strong enough to separate and dissolve all the Principles of solid Food, and to make a good Chyle, whence two Things ensue. One is, that the Blood which is bred from thence, being destitute of these Active Principles, will cause the Rickets; and the other is that the Child, not being strong enough to endure the Pain, will be exposed to all the Accidents already mentioned.

Thus it may be affirm'd that the difference of Climates, bad Milk, the Pain that attends the Breeding of the Teeth, Worms, change of Diet, and other Causes before cited may spoil the Chylification, so that the Blood, being destitute of Volatil and Sulphurous Salts, will produce a Softness in the Bones, if what the analyzing them teaches us be true, *viz.* that they are nourish'd by a Juice impregnated with these two Principles, and that their Hardness proceeds from the compleat mixture, the Application, and the Coagulation of this Juice in the interior Membranes, and the extremities of the Bony Channels.

Of all the Bones, those that are most Porous are most easily soften'd; wherefore the *Vertebra* grow soft the first, and having lost their Firmness they must press one upon another, whence they leave less space between the Holes that are made by their Hollows for the coming out of the Nerves, and these Nerves which issue from the Marrow of the Spine are compress'd, which hinders the flowing of the Animal Spirits into the Parts where the Nerves distribute themselves; and as the Animal Spirits conduce to the nourishment
of

of the Parts, as shall be proved in the sequel, those which don't receive a sufficient quantity of them must sink, grow dry, and Lean.

Upon these Principles it will be easy to explain several *Phænomena* that attend these Diseases, which I shall do after having accounted for the Crookedness of the Bones.

Of the Crookedness of the Bones in the Rickets.

Glisson, a famous *English* Physician, pretends that this Crookedness proceeds from the same Reason as an Ear of Corn bends towards the Sun, or a Plank, Paper, a Book, &c. warp towards the Fire; because the Sun or the Fire attract some of the humid Particles that are in the Pores of the side exposed to them, and drive the others to the other side, which produces the same effect with regard to these things, as several Wedges would do if driven between the separations of the Stones that compose a Column, for if all these Wedges were on the same side, the Column would bend to the opposite one.

Applying this Example to the Crookedness of Bones, he says that they bend when the Nourishment inclines more to one side than the other, because that side swelling and growing considerably, obliges the opposite surface to bend. For this Reason the same Author prescribes the rubbing the crooked side with penetrating Oyl, and hot Cloths, to recall the nourishment into this Part, and cause the nutritive Particles to enter its Pores to extend its Fibres, being assisted by Bandages and Splints, which he orders to be apply'd to the Side opposite to that which is crooked.

This

This System of *Gliffon's* labours under several Difficulties, which have been confuted so often, that I shall think it sufficient to say it might pass for probable, if one knew any Cause that cou'd produce an unequal distribution of the Nourishment in any Bone, and if the Bones did not bend on that side where they receive most nourishment. And in effect the Legs bend outwards, whereas according to what *Gliffon* says, they should bow inwards.

Mayow lays down a quite different System, where he says, that the tendinous Strings and Muscles are wither'd and shrunk for want of Nourishment, whilst on the other hand the Bones far from lessening grow larger, whence they bend, in the same manner as a Cord, being fasten'd to the two Ends of the Trunk of a young Tree, will oblige it to bow, because this Cord can't give way when the Tree grows and struggles to shoot upwards.

Here follow the Objections that are made against this System.

First, There are Bones which being cover'd on all sides, must be equally drawn, and ought not to bend. Nevertheless this happens in those of the Arms and Thighs which are equally cover'd by Muscles.

Secondly, There are no tendinous Strings that are fasten'd to the two extremities of one and the same Bone, as the Cord before-mention'd is to the two Ends of the Tree. On the contrary 'tis seen that the Muscles which have their Origin at one Bone go beyond the Articulation to insert themselves in the Bone below it, whence they draw this Consequence, that the crookedness of the Limbs wou'd only be in the Joints, just as supposing there

there was a Hinge in the middle of the Tree, the Rope cou'd only bend it at that place.

Thirdly, It is not true that the Bones grow more than the Muscles, since Children have been known to be Paralitick for two or three Years, without their Bones growing crooked.

These Objections don't in the least destroy *Mayow's* System. In answer to the first, I say, that altho' some Bones are cover'd all over with Muscles, one must not therefore conclude that they are of equal Strength, on the contrary it may be supposed that the strongest must get the better of the weakest, and force the Bones to bend.

To the second may be answer'd, that altho' there is no tendinous String which is fasten'd to the two Ends of the same Bone, it ought not to be concluded that those which pass by the Articulations are less disposed to bend the Limbs in the middle of the Bones, than in the Joints, and that for three Reasons.

1°. The Muscles that bend the Foot can't keep it continually in that Situation, because the *Extensors* act alternatively: And if it shou'd be objected, that 'tis the same Thing with respect to the Bones, what I shall say presently will prove the contrary.

2°. The Muscles that pass by the Articulation are Antagonists, whence if they act all together, they may perhaps make a *Tonick* Motion, wherein they can't incline the Part more to one side than the other; but with respect to the Body of the Bone, they are as, one may say, congenerate, because they have all a Tendency to bend it the same way, as may be seen in the Leg, where the *Perona* and *Tibia* bend outwards, because the *Flexors* and *Extensors* of the Foot and Toes are all situated

situated on the outside, before and behind, and there is not one in the inside of the Leg, as is known by all.

3^o. The *Musculi flexores*, or *Extensores* must be always in Contraction to make a Limb crooked in the Joint, as happens in Convulsions that produce certain kinds of *Anchylofes*. But it is not the same with the Bones, which may bend altho' the Muscles be not always in Contraction; because the Bones being soft, if they are bent by the Action of any Muscles, they can't recover themselves during their Inaction, the Bones having no Elasticity which they must have to resume their Pristine shape; wherefore continuing in this form, they grow more crooked at the second Contraction of the Muscles, and so on, more and more in proportion, as the Contractions are repeated.

In Answer to the third Objection, I say, That if Children have been seen who have been two or three Years Paralitick without their Bones being crooked, it is not to be wonder'd at; because undoubtedly the Bones of these Children were not soft; and secondly, because the Muscles ought to act in order to bend them, and those of a Paralitick are without Action. Wherefore all the Objections that are brought against *Mayow's* System, tho' they are made by a very Ingenious Man, shall not hinder my following it, at least in part, the rather because I have refuted all the Objections that have been started.

I say then with *Mayow*, that the Crookedness of the Bones proceeds from the Contraction of the Muscles, but I add, that were it not for their softness they cou'd not bend; that the weight of the Head and the Body contributes thereunto, and particularly the

the natural Crookedness that is in all the Bones: Wherefore I admit of four Causes of the Crookedness of the Bones in ricketty Persons, their softness, the Contraction of the Muscles, the weight of the Body, and their natural bending.

And in order to explain the Crookedness of every Bone in particular, I say, first that the Spine bends because of the softness of the *Vertebrae*. Secondly by Reason of the Action of the *Psoas*, *Longus*, *Scalenus*, *Rectus*, and *Obliquus* of the *Abdomen*, which drawing the Breast forwards, oblige the Spine to grow outwards. Thirdly, the Head being very large in Ricketty Children presses considerably upon the Spine, which having no solidity is obliged to give way as a leaden Pillar would when press'd upon by too great a Weight. Fourthly, The Neck bends behind, and grows arch'd forwards, and so of the other Parts of the Spine, because these Parts are naturally a little crooked on that side.

The Ribs are flatted in their middle, and forced inwards by the Pressure of the Muscles *Pectoralis* and *Serratus Major*, so that these half Bows become less bent, whence the Breathing is obstructed, because the *Sternum* is thrust forwards, which makes the Breast seem pointed.

The Cartilages, and the end of the Ribs grow larger towards the Cavity of the Breast, because there is nothing that compresses them inwardly.

The *Ossa Illia* are narrow and bend inwards, by reason of the Contraction of the *Glutai* and *Iliacus*, which, drawing on their side, straiten and bend these Bones.

The

The *Omoplate* are not so large as usual, and thicker, because the Muscles, *Supra* and *Infra-Spinatus*, *Sub-Scapularis*, and *Rotundus Major* and *Minor* which cover them, draw each on their Respective sides, and bring (as one may say) all the Circumference near the Center.

The Arm-bone hardly changes its Figure, because it is surrounded with Muscles of almost an equal strength, besides that this Bone don't serve as a support to any other as does the Bone of the Thigh.

Nevertheless it must be observ'd that when the softness of the Bones is great, it not only grows out behind and in before, at the place of the Insertion of the *Deltoides*, and the Origin of the *Brachiaeus internus*, but very often 'tis found to be half broken, as I have seen several Times, which happens thro' the opposite Action of these two Muscles. This Accident not only happens to the Arm-Bone, but frequently to the Ribs, and middle Parts of the Bones of the Thigh and Leg.

The Bones of the Fore-Arm are crooked in their Fore-Part, because the stronger Muscles are placed there. Besides these two Bones are drawn near to each other, by the Muscles *Rotundus*, *Supinator brevis*, and *Quadratus*,

Altho' the Thigh-Bone be surrounded with Muscles of almost equal strength, it is not the least crooked for several Reasons.

First because 'tis exposed to a number of Motions which can't be perform'd but by the Action of the Muscles, and we have proved that this Action is one Cause of the Crookedness of the Bones.

2^o. Because 'tis the longest of all the Bones of the Body, and 'tis more easy to bend a long than a short one.

3^o. Be-

3°. Because 'tis naturally more crooked than the others.

4°. The reason this Bone bends, is that it props and supports the weight of almost the whole Body, because this weight has the same Effect with respect to it, as when a Man presses a Bow against the Ground to bend it.

There remains now nothing to give a complete Idea of the *Rickets*, but to account for the largeness of the Head, the plumpness of the Face, and the vivacity of the Wit of ricketty Children; as likewise of the Delicacy of the Organs of their Senses, the leanness of the Parts below the Neck, the largeness of their inward Parts, the narrowness of the Breast, and Difficulty of Breathing: In fine, to explain the Adhesion of the Lungs to the *Pleura*, their Hardness, Lividness, and the Imposthumes that breed therein, together with the swelling and hardness of the *Thymus*, the *Glands*, the *Mediastinum*, the *Pancreas* and the *Mesentery*, which I shall do in few Words, and afterwards answer some Objections that have been made against this System.

Explication of several Phenomena concerning the Rickets.

As for the Bigness of the Head, it proceeds from the softness of the Bones of the *Cranium*, in that their Sutures are Membranous, and the Brain which receives the Blood in greater quantity than the other Parts, because of their Compression, must grow, and consequently open the Sutures, and separate the Bones of the *Cranium* that incloses it.

The Plumpness of the Face, and Delicacy of the Organs of the Senses, proceed from the Animal Spirits flowing thither without interruption, whence these Organs must be shaken by the least impression that is made upon them by external Objects.

The largeness of the Face.

Ricketty

Ricketty
Persons
very Wity

Ricketty Persons have a lively and penetrating Wit, because more filtrations are made in the Brain of such Persons than elsewhere, whence they have a greater quantity of Spirits for the Functions of the Soul. The Organs of the Senses being easily moved (as has been said) must carry back all the Sensations to the Soul more regularly, and it must judge more soundly.

All the
Parts ex-
cept the
Head are
lean.

The Parts below the Neck are more lean and fall'n away, because the Animal Spirits that are distributed there, come from the Marrow of the Spine, and the Disorder of the *Vertebrae* causes them to compress the Roots of the Nerves that come from thence, as has already been, and shall be farther observ'd in my Answers to the Objections that have been made.

The Li-
ver and
Spleen
are larger

The Liver and Spleen are larger than the other Intestines, because their Nerves are the 8th Pair, and the Intercostal which come from the Brain.

They find great Difficulty in breathing.

1°. Because the Liver and Spleen, which are large, take up more place in the Breast, and render the *Diaphragm* Convex, which makes the Breast strait.

2°. The Ribs are flat and sink in the middle, which renders the extent of it yet less.

3°. The Muscles that serve to actuate the Ribs have but little Force, and the Ribs thro' their Softness and Weight are more difficult to move

4°. The Distortion of the Spine (whether it bends outwards, inward, or towards the Ribs) alters the Disposition of the Ribs, and the Direction of the Muscles that influence them.

These

These four Points being well explain'd, it will not be hard to account for the Adhesion, the Imposthumes, and the *Schirrhus* of the Lungs; nevertheless besides the Difficulty of Breathing, we may discover two Causes, *viz.* the ill quality of the Blood, and the strength of the Heart.

As for the Difficulty of Breathing, it may cause the Disorders of the Lungs two ways; the one by affecting the Inspiration, and the other by obstructing the Expiration.

By the Inspiration's being hurt, the Lungs not having a sufficient quantity of Air to subtilize, attenuate and prepare the Blood, that comes thither from the right Ventricle of the Heart, will flow thither more slowly, and by its heaviness and grossness will be apt to cause some Obstruction in the Capillary Vessels of the Substance of the Lungs.

When the Faculty of Expiration is affected, the Consequence will be that the Air not having a free Passage thro' the *Bronchus*, and there being but a little of it, the Evacuation of Fuliginous Matter will be imperfect, and the Discharge of the Spittle will be difficult and in small quantity; so that these Humours, being retain'd in the Capillary Vessels of the Windpipe, will cause the Defluxions and Obstructions whereof we have made mention.

Another Cause is the ill quality of the Blood as it is gross and circulates slowly; not only thro' the difficulty of Breathing, but also because it is the product of a crude and indigested Chyle, as I have prov'd in speaking of the Primitive Causes. This bad Blood will stagnate in the Capillary Vessels of the

Pulmonick Veins and Arteries, upon finding the least Disposition thereunto in these Organs.

But one of the Principal Causes is the force of the Heart, which is so far from being lessen'd in this Distemper that it seems to increase, when the Blood is sent from the Heart to the Lungs with more Ease than 'tis return'd from the Lungs to the Heart, which is no small Cause of the Disorders that happen therein.

In fine, it will be easy for me to account for the *Thymus*, the Glands of the *Mediastinum*, the *Pancreas*, and the *Mesentery's* being *Schirrhous*, because I am convinced by Anatomy, that the one serve for a Passage to the *Lympha* and the *Chyle*, the others for the filtrating of the Dissolvents, and in short those of the *Mesentery* for the Preparation and Passage of the *Lympha* and *Chyle*, and we have discover'd a grossness both in the one and the other of these Liquids, sufficient to stop them in the Glands where they co-agulate, harden, and swell.

Having found out both the Primitive and Secondary Causes, and explain'd all their Effects in the Disease in question, I shall now mention some Objections that have been made against the System I have advanc'd.

1st. *Objection*, Children have been known to fall into the Rickets, without its being discover'd that either the Teeth, the Worms, bad Milk, or any such like Causes have been the Occasion of it.

2d. *Object*. There have been some who have never fall'n away, whose Arms and Legs were

were nevertheless crooked, which seems contrary to what I have laid down.

3d. *Object.* Others have only been Crooked and Lean on one side, which ought not to be if what I said in the Causes of the Crookedness and Leanness were true.

4th. *Object.* If the Compression of the Nerves of the Spine causes the Leanness in the soft Parts, it ought, one would think, to prevent the swelling of the Bones which are under the soft Parts that are fallen away.

5th. *Object.* According to what has been said of the good plight of the Organs of the Senses, the Liver, and the Spleen, and the Leanness of the other Parts, it can't be conceiv'd that this should happen thro' the softness of the Spine, which presses upon the Roots of the Nerves, since this Disorder does not affect the Nerves of the Brain, although the Bones of the *Cranium* grow soft, as has been said in speaking of the largeness of the Head in ricketty Persons, and the opening of the Sutures that unite the Bones of the *Cranium*.

In answer to the first Objection, I say, that if any Child has been seiz'd with the Rickets, without any Disorders being perceiv'd in the five Things that I have laid down for Causes, one ought not to doubt but some of them have had a share in it; since one may be mistaken in examining a Nurse's Milk, and in the Judgment one makes of the other Causes; seeing we are often attack'd with

common Distempers, whereof we our selves can but imperfectly guess at the second Causes, and which we cannot certainly ascribe to any Primitive one.

Answer to the second Objection. If any Ricketty Child has been known who has not fall'n away, I may answer that 'tis possible the Softness of his Bones was not considerable, besides that it may only seize upon certain Bones of the Extremities, without the Spine's being touch'd, and that thro' some particular disposition, as I have just said, or thro' some ill posture the Nurse may have used it to, or lastly thro' the Custom of the Child when it walks: For we see some lean to the Right side, some to the Left, and that walk tottering, and bend their Bodies alternatively, first on one side and then on the other, whence the Spine inclines different ways; sometimes the Crookedness is on the Right side, sometimes on the Left, and often it bends towards the Ribs, so as to assume the shape of a Wave.

It will by this Time be easy to conceive why the leanness is but on one Side. For instance, if the Spine bends to the Right, the Hollow Parts of the *Vertebra* will be brought near each other, and the *Vertebra* will, as it were, crush one another on that side that crooked; whilst on the contrary the *Vertebra* will be separated, and their Hollows larger on the opposite side; whence the Nerves of the Spine are only compress'd on the crooked side, and the Animal Spirits not having their free Course, the Parts where they ought to be distributed will be lean and wither'd; whereas the opposite Parts will

will be in good Case, because their Nerves issue from the Spine on those Sides where the *Vertebrae* are not depress'd by each other.

Answer to the fourth Objection. If the Bones don't wither like the soft Parts, that proceeds from the Animal Spirits contributing but little to their nourishment, seeing that this Spirit only helps to nourish the soft Parts by enduing them with an Elasticity that makes an *Equilibrium* with the external Air, to the end that the Blood may penetrate them with ease, without being repell'd by the Spring and Weight of the exterior Air; and the Bones however soft they be have yet solidity enough to oppose this Weight.

Answer to the fifth Objection. 'Tis sufficient to give an Account why all the Nerves that come from the Cavities of the Spine are compress'd, whilst there is no interruption of the Course of the Animal Spirits in the Nerves that issue from the Basis of the *Cranium*. We can alledge Three Reasons.

The first is that the Spine is (as it were) crush'd by the weight of the Head, but the Head having nothing to support, is not so crush'd, wherefore the Nerves may pass without suffering any Compression.

The second is, That the Nerves of the Spine run a greater length than those of the Brain, excepting the 8th Pair and the *Intercostal*.

The third is, That the Nerves of the Spine come out Hornizontally, and those of the Brain Perpendicularly, whence they are not compress'd like those of the Spine.

All that we have said seems sufficient to give an Idea of the softness of the Bones, of their Crookedness, and the other Accidents that proceed from it; we shall go on to the Prognostick and the Cure.

The Rickets are seldom cured when there is an *Hydrocephalus*, because this Disease is Mortal of it self, especially when it is come to that Height as to separate the Sutures.

They are but seldom cured whose conglobated Glands are hard and Schirrous, and particularly when those of the *Mesentery* have this Defect, because the Chyle must pass thro' these Glands, which it can't easily do. And as Life is preserv'd by the Chyle, which passes thro' these Glands to mix it self with the Blood and renew it, if this Passage be once intercepted the Animal in the end must perish.

They who have not bred their Teeth but seldom recover, both because they sink under the Pain of cutting them, and because 'tis necessary they shou'd have them to chew, especially if they are wean'd.

They whose Spine is not crook'd are more easily cured: In short, such as eat with a good Appetite, and are brisk and lively, recover sooner than others.

The Question at present is, How to cure this Distemper, and it must be observ'd, that it is like others easier to be master'd in its Infancy, then when it has been of some standing; that 'tis much easier to prevent it, then to hinder its Consequences, and that when it is once at the height, Art has less share in the Cure of it then Nature: And what

what is most certain, is that one can't destroy any of its Effects, but by removing the Cause. Therefore to follow in the Cure, the same Order that I have observ'd hitherto, one must first have regard to the Primitive Causes, after which the secondary Causes and their Effects may be destroy'd.

As to the Primitive Causes, one wards against them as much as possible, by letting Children breath in a fine Air, by giving them nothing that will breed Worms, but especially by providing them good Nurses, and not making them leave a good Milk till they have most part of their Teeth, without which they fall into this Distemper as has been said. And if for want of taking these precautions, the Child happens to be attack'd with this Distemper, here is in two words what must be done, either to cure it entirely, or palliate it.

First one must prescribe a Diet, which is different according as the Causes are different: If the Air be in fault, the Patient must change his abode; or if that be not possible the Air wherein he resides must be corrected by the perfume of Plants impregnated with Sulphurous Particles, by the Calcination of Partridge's Wings, of Kids, of Hartshorn, and other things that are full of Volatil Salts.

If the Teeth are hard to cut they must be help'd by rubbing the Gums often with the Blood of a Cock's-Comb, the Brains of a Hare, the Oyls of Sweet Almonds, Lillies, Palm, and other little Remedies, which Success has made customary amongst those who have the Care of, and Nurse Children: If

the Gums are too hard, they may be lanced to facilitate the cutting of the Teeth.

When there are Worms one must bleed to prevent an Inflammation, and give Clysters of Milk, with a Decoction of Figs, Raisins, and a little Sugar. On the contrary one must give them all the Bitters at the Mouth, as the Preparations of Wormwood, Succory, Rhubarb, *Quinquina*, *Opium*, and other Medicines that are proper to kill them.

The sweet Clysters attract the Worms, which being but meer Machines, must mechanically remove from the bitter Medicines that are taken at the Mouth, to draw near the sweet one, which we have recommended to be given in Clysters, which they can't do without approaching the Passage whereby one would expel them. But to dispose them the more to pass, one may give Catharticks with Succory Water, the Syrup of the same Plant and *Rhubarb*, or in its stead the *Syrupus Magistralis*, which produces two good Effects, for the Bitters kill or drive away the Worms, and besides the working of the Purgatives, quickens the Peristaltick Motion of the Guts, which inclines these Vermin to crawl downwards.

One must not forget Emeticks, and the Preparations of Mercury, which are good to kill the Worms and to discharge them, as well as the Verminous Matter. Infine, the Patient must be made observe a Regimen, by prohibiting the Use of all Food that is sweet, milky, or apt to turn sour.

If the Nurse who has begun to Suckle the Child, has not a good Milk, is Sick, has any Chagrin, is obliged to work much, or
fares

fares hardly, one must provide another from whom the Child may derive a good sustenance, to the end the Chyle, the Blood, and the *Lympha* may be corrected, so as all the Parts may resume their Plumpness, the Bones may grow and harden, the Teeth may cut, and the Child may have Strength sufficient to bear up under the Pain they cause; so that if the Child falls into the Rickets immediately after being wean'd, and has been wean'd too soon, or before the cutting of its Teeth, it must be provided with a good Nurse, whilst one endeavours to destroy the secondary Causes and their Effects, after the following manner.

One must Purge, but it must be seldom, and with the most gentle Remedies, unless there be any Worms, because 'tis not so necessary to evacuate as to correct the Blood and the *Lympha*, by the Decoctions of Aromatick Plants, and by Broaths, wherein one may put the *Polypodes*, the Powder of Vipers, instead of common Salt, the Volatil Salts of Hartshorn, and *Cranium Humanum*: In a word all Volatil Salts are proper.

If the Child can't take these Remedies, or even if it takes them easily, one can't do better than to make the Nurse use them also.

As for the Deformity of the Spine, the Breast, and other Limbs, they may be corrected, and even remov'd, if besides the Remedies prescrib'd, Care be taken to keep in the Spine by Bodice, and the Arms, Legs, and Thighs, by bandages of Leather, Linnen, and Steel, and by a Boot.

This

This is the sum of what I thought proper to say, in order to give an Idea of the Rickets; if I have been more prolix upon the Causes, and the Explication of the Symptoms, than upon the Methods of Cure, 'tis because I am convinced that Diseases which are once well known, indicate of themselves the Remedies that are proper for them.

FINIS.



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